

MARCH 1954

35 CENTS

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND

REG. U.S. TRADE MARK, GREAT BRITAIN, NO. 40428



**THE SHAPE OF
TOMORROW'S PLANES**
—Page 133

What Owners Think of the
'54 CHRYSLER
by Floyd Clymer

For the Craftsman
HOW TO HANG WALLPAPER
How to Buy an Outboard Motor

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of that day and kerosene was cheaper than gasoline.

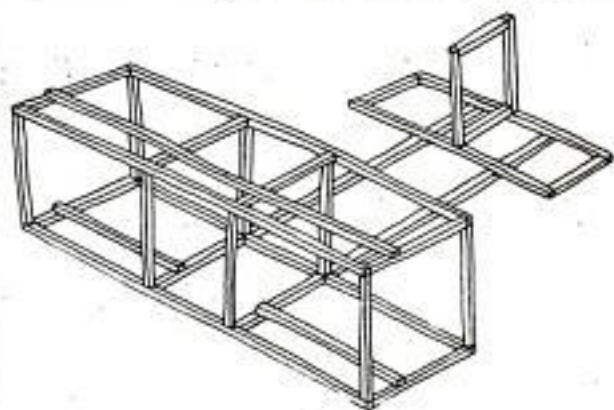
The few major improvements that Stanley did make in the last few models were indicative of the possibilities and if the engineers would take up from there, I believe with Mr. Orris that they could make today's methods of using steam look primitive in a very short time.

What the engineers are trying to accomplish today with automatic transmissions had already, in effect, been accomplished in the steam automobile of 30 years and more ago.

Glenn G. Smith,
Bellmore, N. Y.

To the Editor:

In your December 1953 issue is a letter from Ralph Hall of Seattle, Wash., who reminisces concerning a PM glider which he built and flew in 1909. While I am a much younger man, let it be known that PM inspired not only a first, but also a second



generation of embryo aviators. Unfortunately, I did not see your aviation issue of this year, but my father at one time bound a collection of his PMs and, as a child about 12, I came across this collection. In it was an article concerning the glider plans mentioned. Not having a set of the complete plans, nor the materials to make use of them, I was forced to improvise.

As you may well imagine, my glider was built under top secret conditions in order to provide an opportunity for test flight. The frame was nailed together and was made of 1-by-1-inch stock. It was covered with strawboard from shipping cartons because I had no other material and dared not ask for any. It was a one-day project from beginning to end. The frame was built as above, a design adapted to the materials at hand.

All went well until the moment of flight. At that time, my grandmother penetrated my screen of secrecy and saw me take off

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You Practice Servicing with Equipment I Send

Nothing takes the place of PRACTICAL EXPERIENCE. That's why NRI training is based on LEARNING BY DOING. With my Servicing Course you build the modern Radio shown at right, a Multitester which you use to help fix sets while training. Many students make \$10, \$15 a week extra fixing neighbors' sets in spare time soon after enrolling. My book shows other equipment you get and keep.



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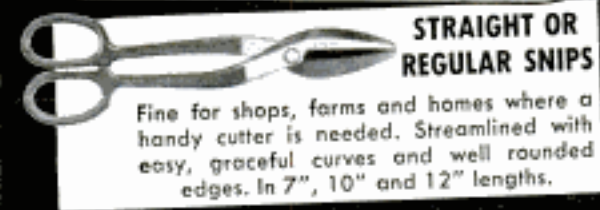


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INVENTORS

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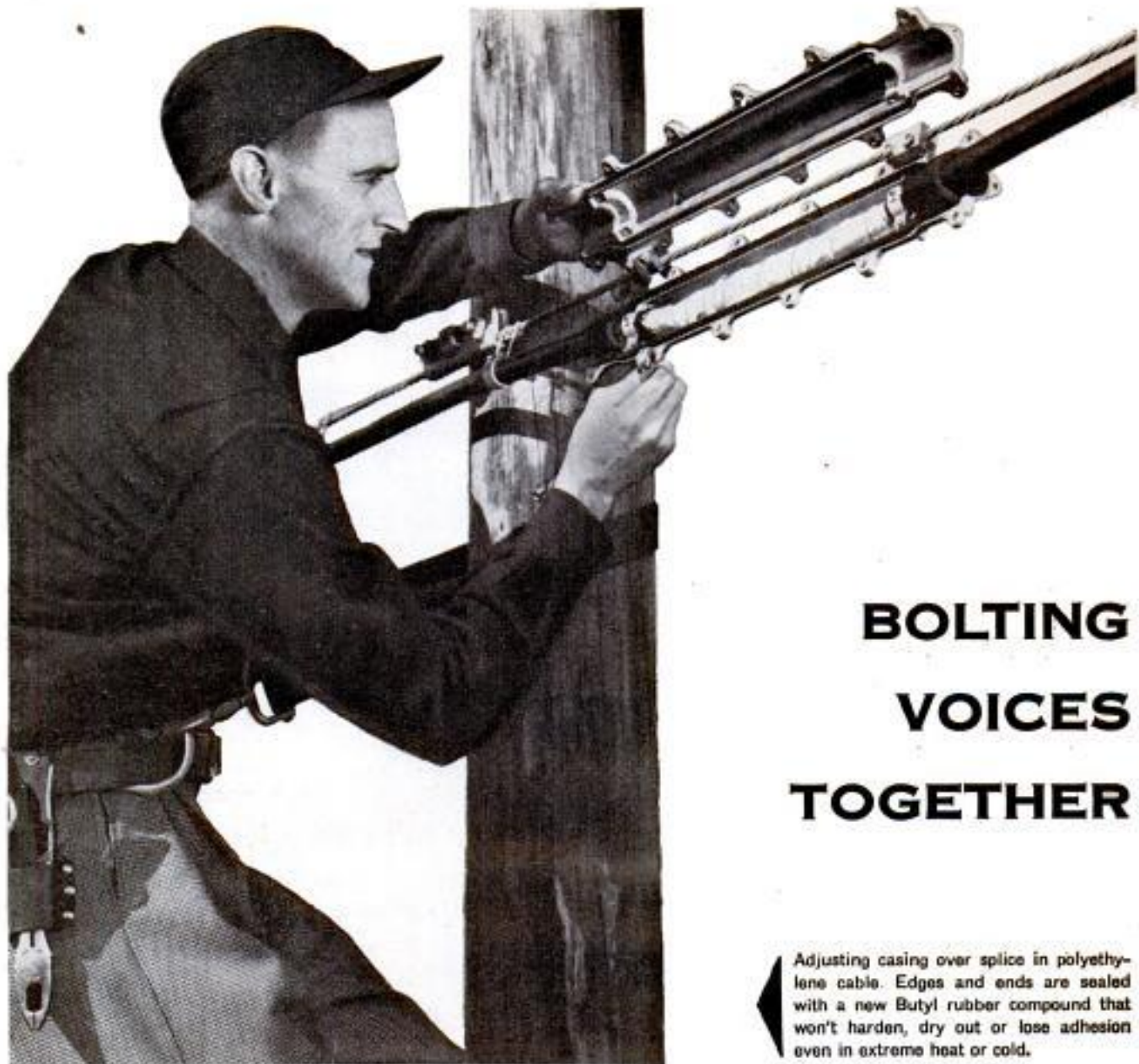
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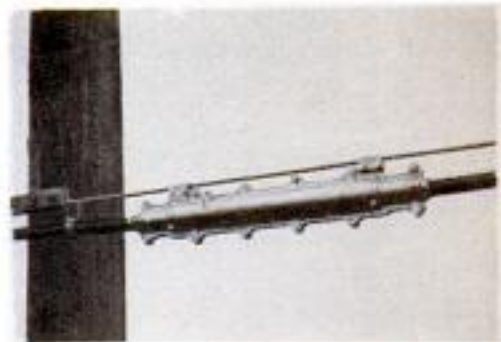
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this month's cover

TOO BAD we can't see the facial expressions of the two men on that high control tower. They probably have seen as many weird planes in the sky as anyone on earth, but we'll bet they're still startled when they see a black triangle streak past. This is just one of the odd-shaped aircraft — delta wings, swept wings, straight wings and others — under design in America's aircraft factories. These unconventional planes are tested at Edwards Air Force Base, Calif. The 140-foot tower is midway on the main runway. Eventually the runway will connect two dry-lake beds which have surfaces as hard as concrete. The lakes and the runway combined will provide a 22-mile-long strip, and even the fastest and weirdest of planes should find plenty of room there to land. What will be the shape of tomorrow's planes? A feature article starting on page 133 gives you a look at some odd shapes under test and some conclusions about the future

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Other items, and manufacturers of available products described, are listed on pages 12, 14 and 16

Texaco Tips

How to keep your air filter clean

If your carburetor air filter is clogged with road grit and grime, it cannot perform its necessary function. The result? —your engine suffers from metal-wearing matter. To keep it clean, free from clogging sediment, see your Texaco Dealer. If necessary, he will remove the filter element and wash it thoroughly in kerosine. Oil bath type filters will get an oil change to the right seasonal grade, as needed. Extra care like this helps keep your car running better and running longer.



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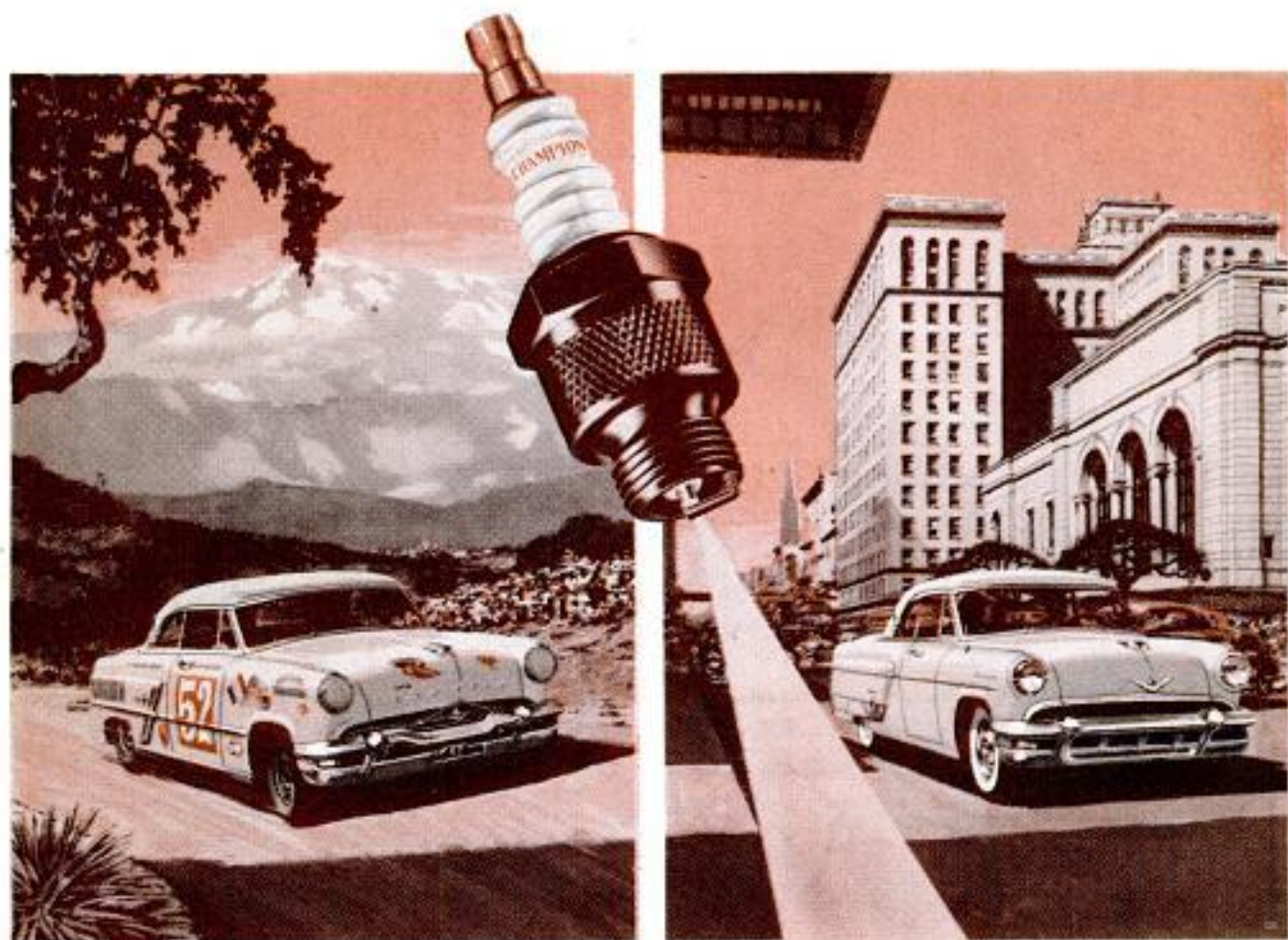
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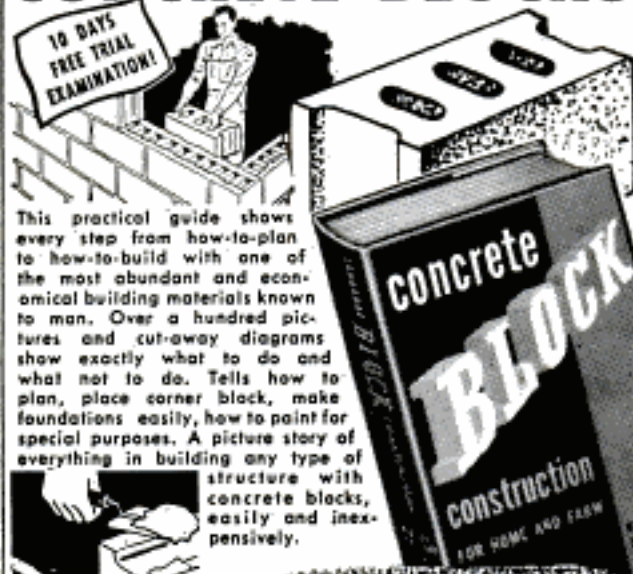


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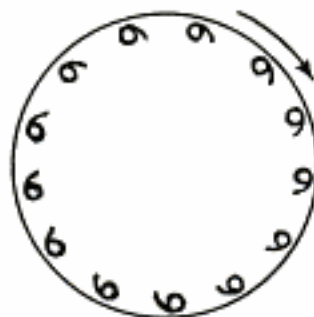
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—The Editor.

To the Editor:

Your article on "Perpetual Motion Just Isn't" (Jan. 1953) is interesting. I was reminded that the various ideas for perpetual motion are just about as practical and sensible as one my physics professor used to give to his classes. The idea is illustrated by the accompanying sketch.



On the rim of a mounted wheel the figure six is placed at frequent intervals. However, on the right side the figures became nines. Nine being heavier than six, the wheel rotates as shown.

B. E. Kimble
 (Retired teacher)
 Morgantown, W. Va.

To the Editor:

Congratulations on your article "Trailers Are Stay-at-Homes Now" (PM, Dec. 1953).

Having lived in trailers for seven years, I am very much interested in trying to prove to the average person that a trailer makes an excellent place to live. I'm sure all trailerites feel that you have aided our cause in fighting the prejudice people have against trailers.

(Continued to page 8)

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B.F. Goodrich
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**2 THINGS
 SOLD ME!**

(Continued from page 6)



I own a two-story Ventoura, so I was able to detect a slight error on the length of the trailer. The length is 44 feet, instead of 41 feet. I'm enclosing a snapshot of my trailer. The Crosley is mine, too. Would anyone need any more proof that "Trailers Are Stay-at-Homes Now"?

David S. Eicher,
 Airbase Trailer Park,
 Route 5,
 Columbus, Miss.

To the Editor:

I would like to comment on the remarks of Mr. Orris in his letter published on page 10 of December (1953) *Popular Mechanics* regarding the gas-turbine truck experiment in the West and the problem of fuel consumption and noise to be overcome.

Mr. Orris has a good question regarding steam as a method of propulsion for trucks, although I don't know why he mentions only trucks. Why not passenger cars as well?

There is something about American ingenuity that drives it toward the greatest obstacles rather than in the line of least resistance. It is my firm conviction that if as much money and effort had been applied to the development of the steam engine for automotive power as was to the internal-combustion engine, that steam would dominate the scene today.

My first car was a 1910 Stanley Steamer; the next was a popular car with internal-combustion engine and a cone clutch. I was so disgusted with the slip-grab clutch problem that I got another Steamer and, except for the delay attendant to firing up, it was far superior to the internal-combustion cars of the day. The Stanley brothers were just beginning to wake up to the fact they must "get up-to-date" if they were to compete, when they went out of business. The simplicity of the steam engine was very important, repairs easily made. Power was available at the wheels, no clutch or automatic transmission to cope with.

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(Continued to page 10)

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Electronic recording equipment keeps score as rats take intelligence tests at Pomona College, Calif. Three metal bars projecting into the testing chamber are connected to an automatic timer and a series of counters which record the rat's learning behavior. If the rat touches one bar, he is rewarded with a drink of water. Another bar produces an electric shock, and one can be wired to flash a light.



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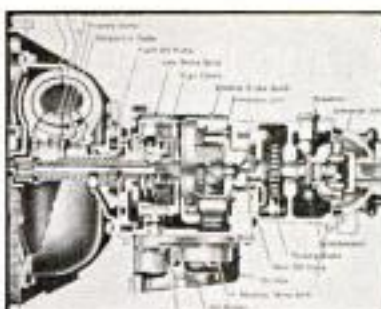
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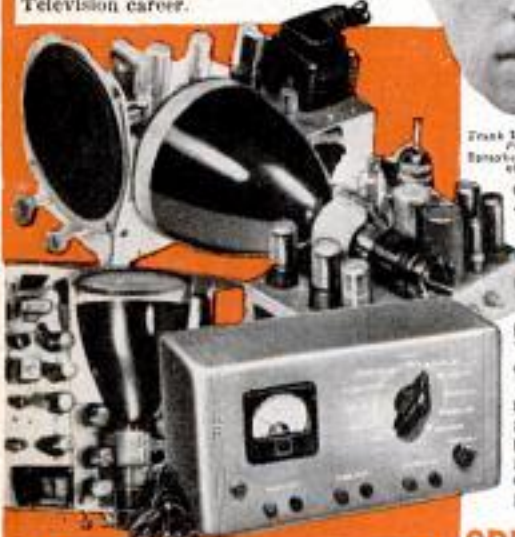


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7900x16	78.25	7900x18	78.25
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8000x16	79.25	8000x18	79.25
8050x16	79.75	8050x18	79.75
8100x16	80.25	8100x18	80.25
8150x16	80.75	8150x18	80.75
8200x16	81.25	8200x18	81.25
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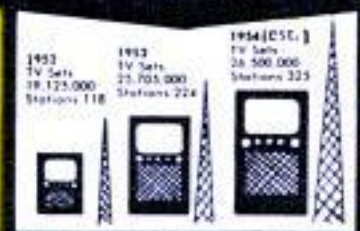
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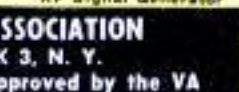
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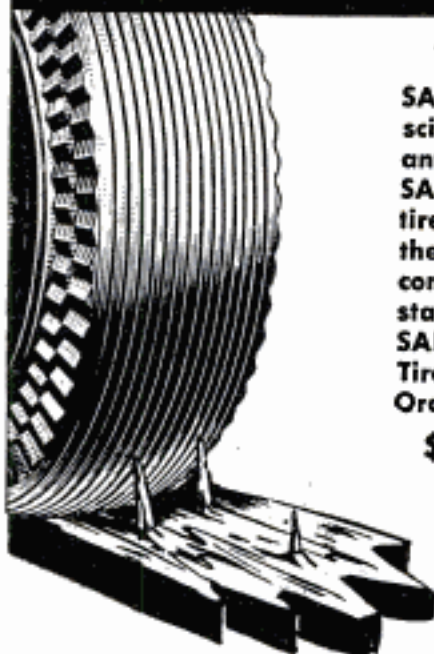
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\$1.98 per tire - \$7.92 for 4 tires

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Fill your spare tire with SAFE-T-GARD. By the way, SAFE-T-GARD will make spares obsolete. Now put the tire on any wheel and drive your car 25 miles. You have just puncture proofed your tire. Prove it by driving a spike into the tire. You won't lose one cubic inch of air! Amazing, but SAFE-T-GARD has been laboratory and road tested.

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Name.....

Address.....City.....Zone.....State.....

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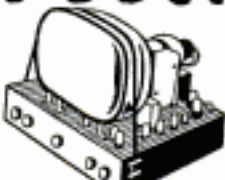
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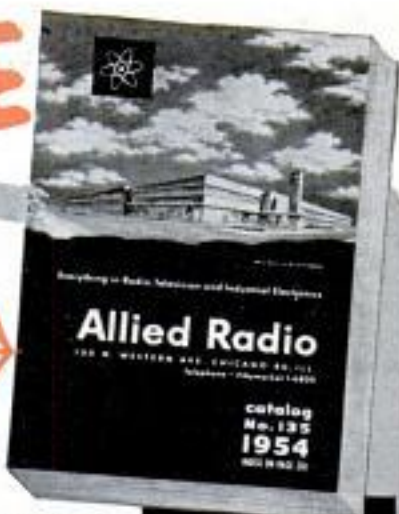
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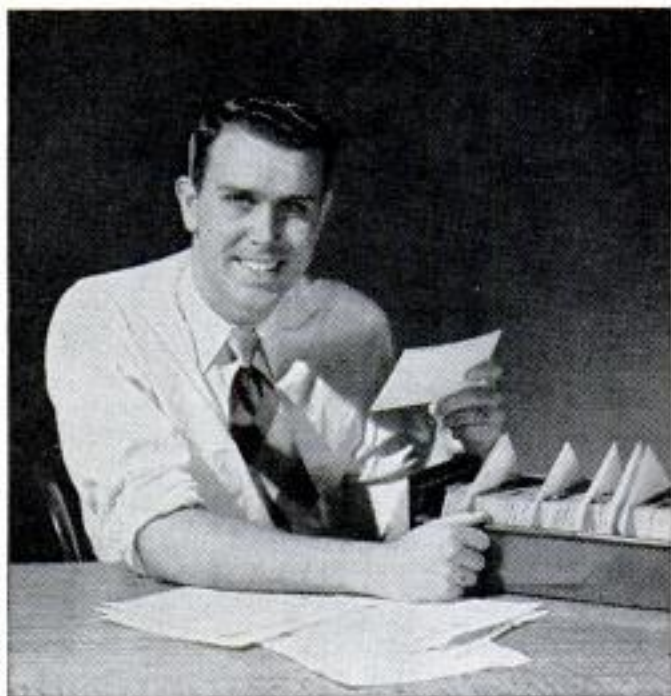
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MAKE Tough, durable plastic of waste—Easily. Makes attractive, resilient floors, walls, built-ins etc. Build good home for half. Bays Laboratory, Oklahoma City 9.

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NEED Capital? Free details. How and where you can get any amount. Colburn, 429-P South Wetherly, Beverly Hills, Calif.

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PACKAGED Food mailorder business. Home operated. Everything supplied. Successful proven plan. Free details. Frazar Foods, Desert Springs 13, California.

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MAIL Order beginners. Start operating immediately. Real merchandise. Everything furnished. Get \$10.00 orders. 100% profit. Don't wait. Get started. Information free. Dumont, Room 612, 216 West Jackson, Chicago 6.

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MAKE Perfumes, other products at home. Write Carey, 1914-PM3 Chouteau, St. Louis 3, Missouri.

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HAVE Home business mailing literature. Easy, pleasant, profitable. Everything furnished. Write: Sherron, Box 343P, Bloomfield, New Jersey.

NEED Money? Want independence? Your own boss. Start home mail order business on shoestring. Write: Cox, Saugus 10, Mass.

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BUILD Luggage and cases at home. We sell your products. No special equipment needed. Free details. Cascraft, 803-P4 Sunset Blvd., Los Angeles.

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PAINT—Sell figurines, plaques. Free folder. Plasterines, 105P Parkway, Tiffin, Ohio.

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HOME Business sharpening lawnmowers sparetime brings \$100.00 monthly. Get business through hardware. No experience necessary. Send for free instruction book and business plan. Vernon M. Foley Company, Columbia Heights, Minnesota.

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PLASTICS Home-craft course for men and women. Tells and shows how to make hundreds of fast selling plastics products. All plastics and materials for 23 projects included in course. No special tools needed. Course pays for itself. Write for free booklet, Interstate Training Service, Dept. D-3-C Portland 13, Oregon.

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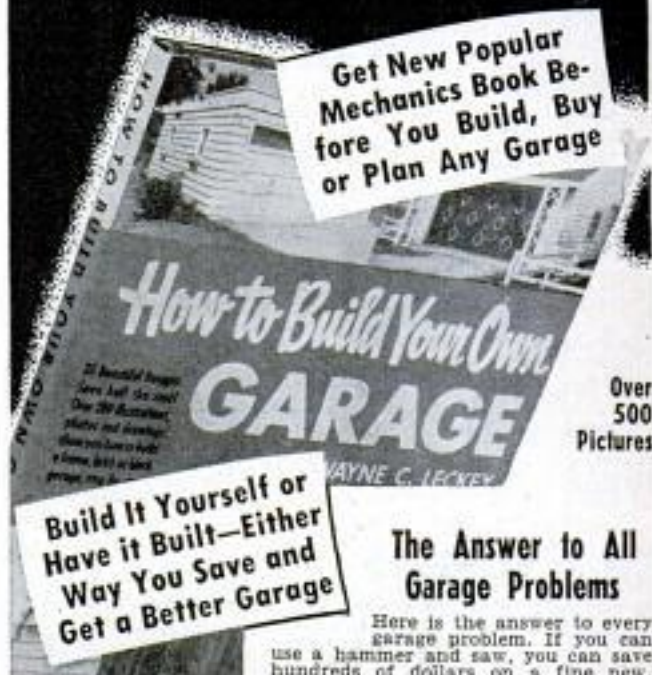
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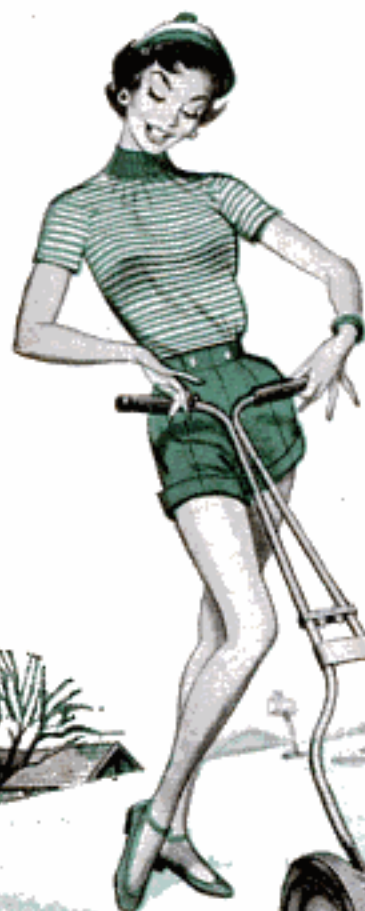
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2 Chrome plated rings retard wear

3 Therefore TOP rings must be chrome plated to retard cylinder wear

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POPULAR MARCH 1954 MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 101 NO. 3

Mel Koontz

TWISTS TIGERS' TAILS

By Carson Kerr

AS HE HUNG UP the telephone, W. J. "Billy" Richards scratched his head. Turning to Trader Horne, the famous wild-animal trapper, he explained, "Republic wants to shoot a sequence with a leopard leaping at a hunter, only they want it to be stopped in mid-air, as though it had been knocked for a loop by a bullet."

"That's a tough one," observed Horne, who is Richards' partner in the operation of Hollywood's "wild-animal stock company," the World Jungle Compound at Thousand Oaks, Calif. "Still, I wouldn't worry about it. The studios haven't stumped Mel yet."

When they conferred with their chief trainer, Melvin Koontz, he wasn't too optimistic. He pointed out that the leopard, the most unpredictable of all wild animals, is therefore the hardest to handle. However, he'd had some odd requests from moviemakers before and had always managed to meet the requirements, one way or another.

"It would have been simple to have had the cat on a wire, so it could have been yanked back," says Mel now, "but regulations of the Society for the Prevention of Cruelty to Animals don't

Koontz, who trains wild animals for their movie appearances, here coaches a ferocious student—one of Mabel Stark's Royal Bengal tigers. In years of work with the big cats, he's been hurt only once





"Impossible" picture taken at the World Jungle Compound shows natural enemies—elephant, camel, water buffalo, chimpanzee, leopard, black panther, tiger and lion—all obedient to commands of the trainers



permit anything like that. We got what was wanted almost by accident. At best, a leopard merely tolerates a human and, if he happens to take a dislike to you, watch out! The cat couldn't stand one fellow, so I put him on a platform seven feet high, the limit of the cat's leap. Then we turned the leopard loose. When he sighted his enemy, who was jeering and waving a stick at him, he leaped. His front claws caught the edge of the platform, which was just out of the picture. He clung there for a few seconds, then fell on his back. Normally he would have landed on his feet, but the force of the leap threw him off balance. It looked for all the world as if a bullet had caught him as he leaped at the actor on the ground."

Though difficult, this was nowhere near as risky as some of Mel's other activities in doubling for film stars in wild-animal scenes—from the time he pinch-hit for Mae West in *I'm No Angel* (1933) to his performance in place of Victor Mature in the forthcoming *Demetrius and the Gladiators*. He rates the latter assignment as his most hazardous one because he had to appear to kill three different tigers and, therefore, engage in three dissimilar death struggles. While the same tiger, Satan II, was used in each sequence, the wide variation of action increased the danger much more than threefold.

"When Mel previously doubled for Mature in *Samson and Delilah*," Billy Rich-

Big lion, one of Koontz' best animal actors, holds trainer's arm in his jaws and nuzzles him on cheek





Koontz, doubling for another actor, plays role of Daniel in the lions' den for the movie *Slaves of Babylon*

ards recalls, "he did not use a 'safe' cat for the actual combat scenes. The reason for this departure was that Cecil B. de Mille is a stickler for authenticity and he insisted on a continuous shot, showing a very angry lion attacking Samson. When the scene was filmed, the lion leaped with fangs bared and claws unsheathed. For a moment 'C.B.' seemed to think that he was going to get more than he'd bargained for. So did Mel!"

Trainer Koontz is, of necessity, an accomplished actor. In *Slaves of Babylon* he doubled for Maurice Schwartz in the biblical role of Daniel in the lions' den. Surrounded by six big males, he held an attitude of prayer for a full minute. Then without giving the cats a single glance he

Script for another movie, *Samson and Delilah*, required Mel to come face to face with this ugly creature

stepped over the nearest one and walked away.

"Afterward I thought 'What a sap I am to take such chances,'" Koontz comments. "Sure I had some assistants standing by, but they were 30 feet away. Besides, I was wearing a long, black cloak and a rubber mask that made me look exactly like Schwartz. The cats could recognize only my voice, and anything could have happened. They tell me it was most impressive, but I wouldn't know. I never see any movie in which I appear. If I did, I might decide that my work isn't worth the risk involved."

For *Mighty Joe Young*, the sensational film about a giant gorilla of King Kong stature, Mel made possible the scenes where the mechanical anthropoid hurled

Authentic action shot resulted when Koontz, dressed for role, goaded the big cat into leaping at him



Koontz, doubling for Victor Mature in *Demetrius and the Gladiators*, was called on to "kill" three ferocious tigers. Though the same tiger was used in each sequence, the action was entirely different and the job was one of the most dangerous he ever attempted

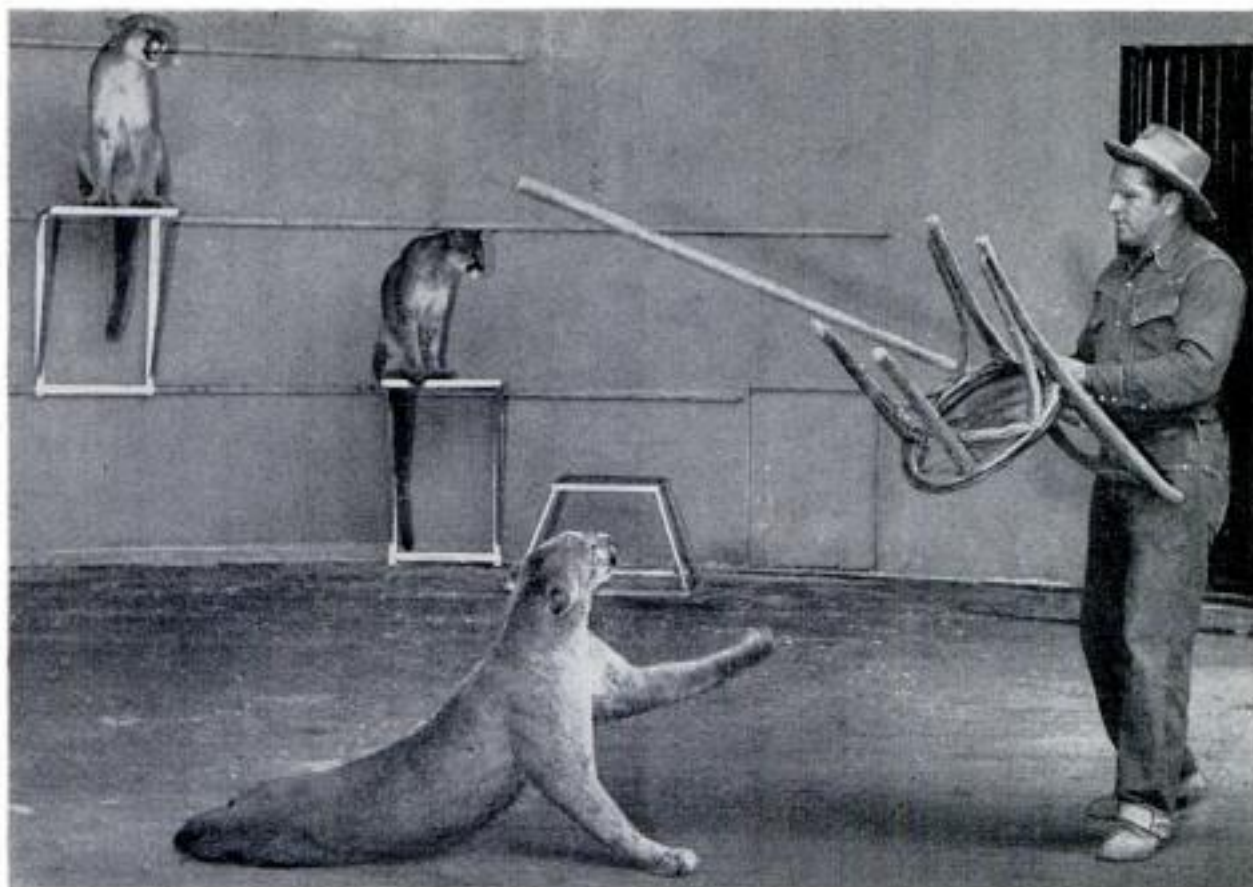


a live lion across a dance floor, but he almost "goofed" on that one. The cat was dumped from a chute onto a floor built on a 45-degree angle, so that the animal seemed to skid across a level one. In preparing for the first take Mel misjudged the balancing point of the contraption, and both lion and trainer tumbled out. Fortunately the feline's feeling was one of disgust rather than fear or anger. Otherwise, Koontz figures, his career as a cat man could have come to an unexpected end.

What amuses him most in recalling the incident is that the SPCA man on the set seemed more concerned about the cat than the man. Hollywood has rigid regulations ensuring the safety and comfort of animal actors, but no similar provisions for human players.

Having handled the great majority of lions, tigers, leopards and panthers seen on the screen, Koontz has become accustomed to taking chances. Yet, when he reviews some of the risks to which he's been exposed, it makes him wonder. He says he never will understand how he and his protegee, Pat Anthony, got away with a stunt they pulled for a circus movie. The script called for a fight between two trainers with a group of lions looking on. It was something most animal trainers would have refused to attempt, but they doubled for the actors and staged a realistic battle, unmindful of seven cats in the arena with them—any one of which might have joined in the melee at any moment.

Koontz contends that at least 98 percent of the world's wild-animal trainers do it the hard way. With whips, clubs and guns they try to show the animal who is boss. When a cat is crowded with a chair or has



a whip cracked in his face, Koontz feels, its first thought must be, "How can I escape from this character?" Even though he may kill the trainer he's usually just trying to get away from him. Instead of force, Mel uses persuasion, preferring to work with nothing more than a small stick or an old buggy whip and using these more to illustrate his commands than to threaten. He talks his cats into doing what he wants them to do. When a new animal recovers from the shock of such unorthodox treatment, it often becomes friendly.

Koontz is the only Compound trainer who has never been bitten by a chimpanzee. Two chimps that sample other trainers regularly are crazy about him, and sulk if he happens to pass their cages without pausing to play. When he works chimps, he starts by wrestling and kidding them, then demonstrates what he wants them to do and finally says, "Okay, boys, let's go to work!" For him, they perform as willingly as they play.

A trainer who had taught a nervous lioness to take a seat at the front of the Compound area was unable to get her to take the next step and go to a higher platform at the rear. After five days of threatening and scolding, during which the lioness refused to budge, he called on Koontz. Mel went in without even a stick and in five minutes eased her onto a low seat at the back and then got her to take the high one.

(Continued to page 262)

When breaking in new animals, trainer uses stick and chair, but soon discards them to face the cats with his best weapon—his ability to sense their thoughts

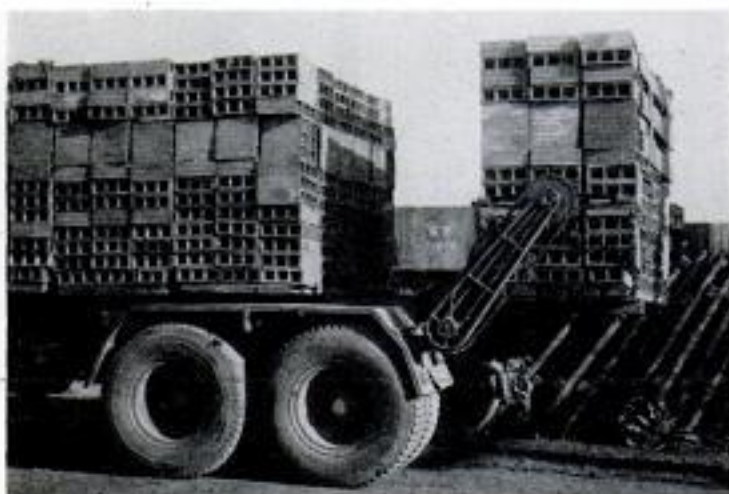
Koontz rehearses action scene in the studio jungle setting. Some animals are playful and enjoy his clowning as much as the spectators at the studio





Rear-End Pallet Loader Hoists Bricks on Truck

Pallets loaded with bricks are hoisted onto a truck which mounts a loader on its rear. A power take-off moves the lifting arms, which are lowered so that chain bridles grip under each end of the pallet. The load is swung up onto the bed of the truck. There transfer rollers driven by a second power take-off roll the load ahead. When the truck is loaded it is backed up to the trailer and transfer rollers carry the bricks back to load the trailer. Seven pallets, each carrying 6500 pounds of bricks, can be loaded onto a truck and trailer. Fewer chipped bricks, a



saving in labor and time and "spot" unloading result. The loader was developed by R. H. Berg of San Francisco.

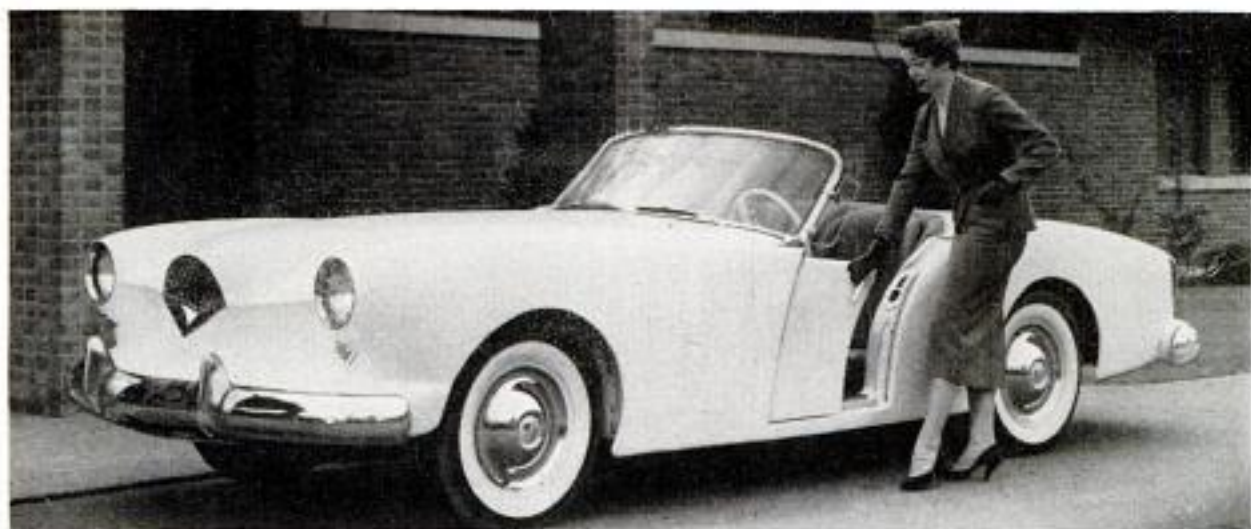
Two Headlights on Power Mower Permit Lawn Cutting After Dark



Now you can mow your lawn at night. One new reel-type power mower has twin headlights that illuminate a broad swath in front of the operator. The lights permit the homeowner to work in the cool of the evening and, according to the manufacturer, help him do a better job because the grass is freshened by dew.

Freezer Aids Surgery

Infected limbs are frozen before amputation with a portable electric freezer used at the Indiana University School of Medicine. A small case that encloses the infected limb is connected to a separate freezing unit. The method is more convenient, less painful and more efficient than the older method, which uses crushed ice.



Doors on the sleek Darrin slide forward into the body. The base of the windshield is only 36 inches high



Kaiser Plastic Sportster Goes Into Production

Left, in true sports-car tradition, the Darrin has a stubby gearshift lever mounted on the drive-shaft tunnel. Passenger side of dashboard is padded. Panel contains a tachometer, of course. Below, production of the plastic cars is on a miniature assembly line

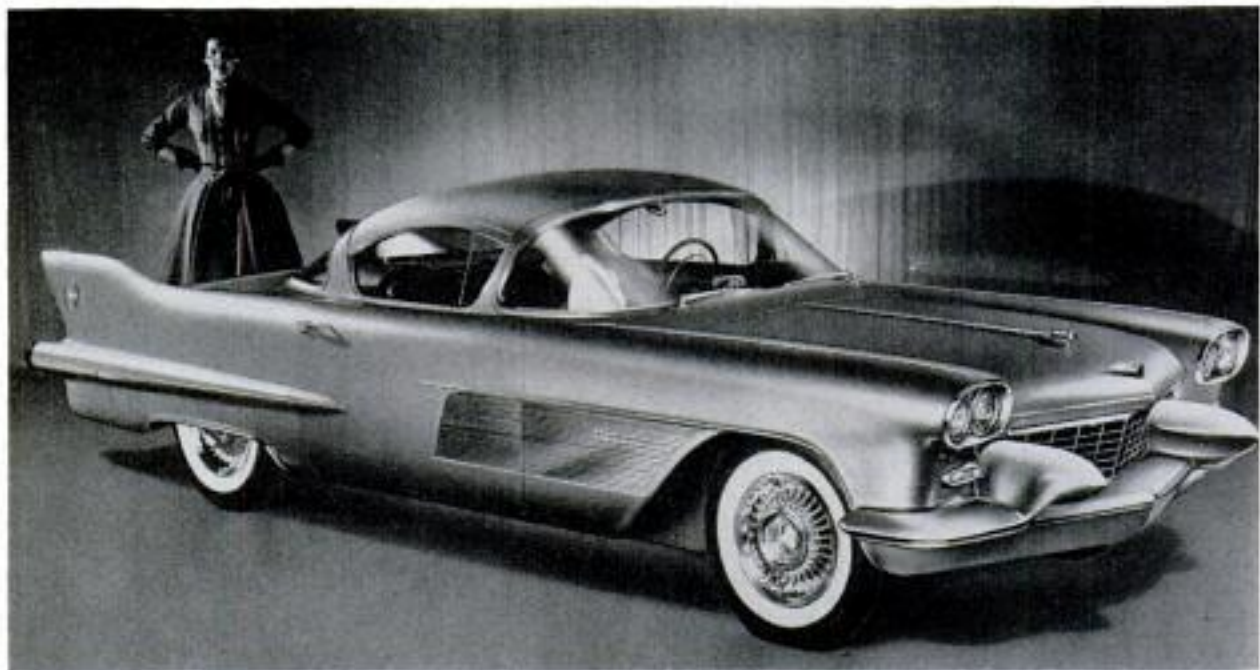
LONG, LOW AND SPORTY is the Kaiser Darrin 161—a plastic two-seater that is now in production. Designed by famed Howard Darrin, the all-plastic body weighs only 300 pounds. Almost without ornamentation, the trim sportster is only 36 inches high at the cowl. Doors slide forward to open, facilitating entry and exit when parked in close quarters.

Seats, padded dash and top are embossed vinyl. The front portion of the top can be left open in "landau" style, if desired. A large trunk provides space for luggage and spare tire. The folding top goes down into a separate well.

Powering the 2175-pound plastic car is a six-cylinder 90-horsepower F-head Willys engine.

Now in assembly-line production (but in small quantities because of the hand work required), the Darrin will sell for \$3668. Included are overdrive, windshield washers, white side-wall tires and tinted glass.





CADILLAC'S car is an aluminum-roofed coupe on which familiar Caddy styling details have been exaggerated

THIS YEAR'S CROP OF DREAM CARS



DETROIT STYLISTS are frustrated—they can't let themselves go on regular models because of price, production and sales limitations. But each year, thanks to plastic bodies (which permit inexpensive single-car fabrication) and a publicity budget, they go all out on an exciting and stimulating crop of "dream cars."

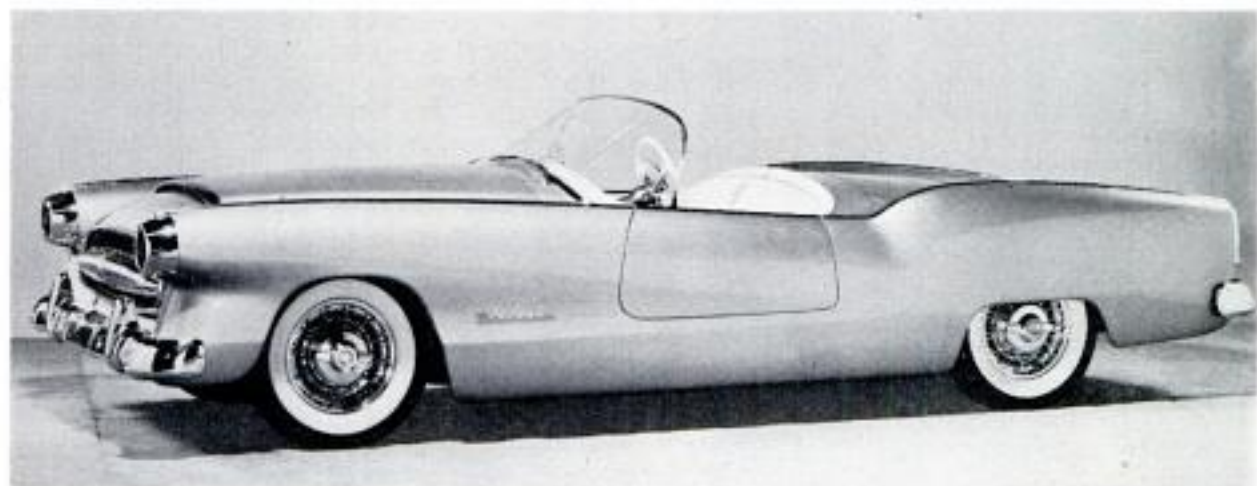
PONTIAC is showing a sports-type car that is called the Bonneville Special after the famed speed track on the Utah Salt Flats

PACKARD displays its Panther, one of few plastic bodies built on a full-size chassis. It has a 275-hp. engine



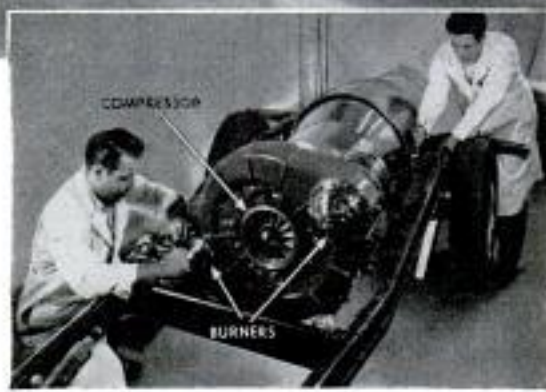
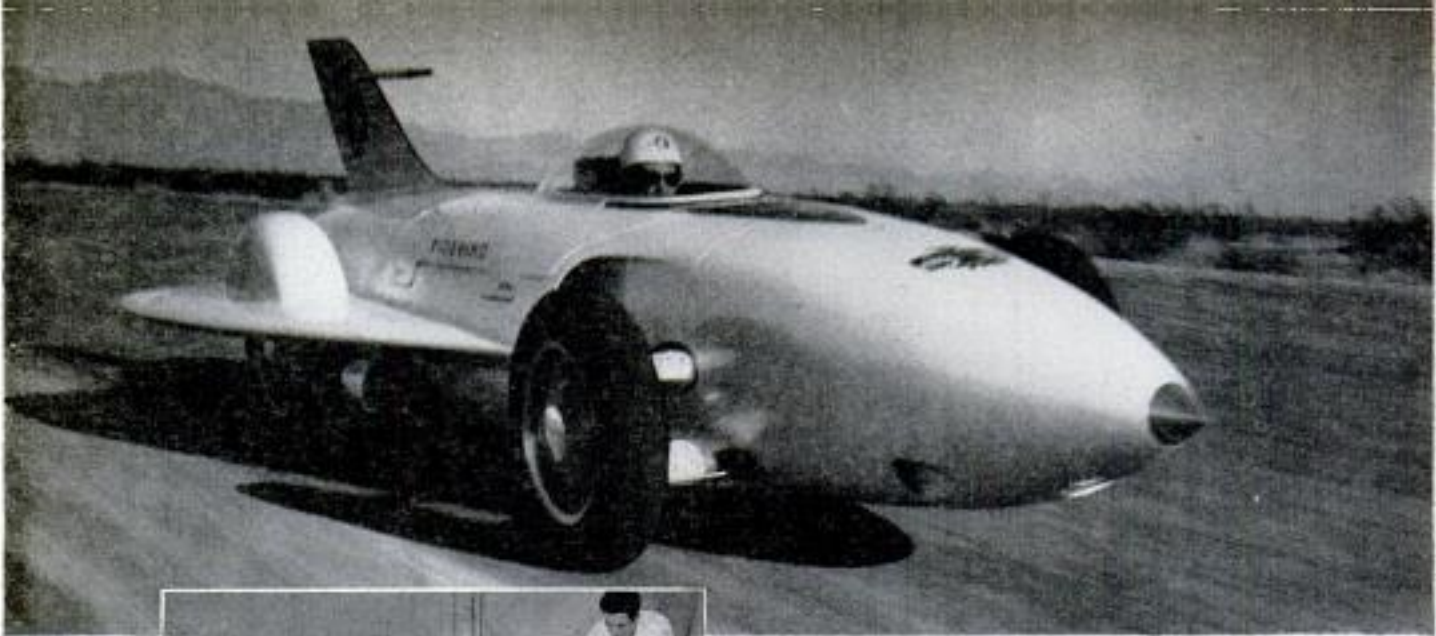


OLDSMOBILE calls its model the Cutlass. Recessed headlights, high tail fins and a bubble-like top give it a futuristic look. Front-wheel housings are perforated to exhaust engine heat. See page 91 for Buick's Wildcat

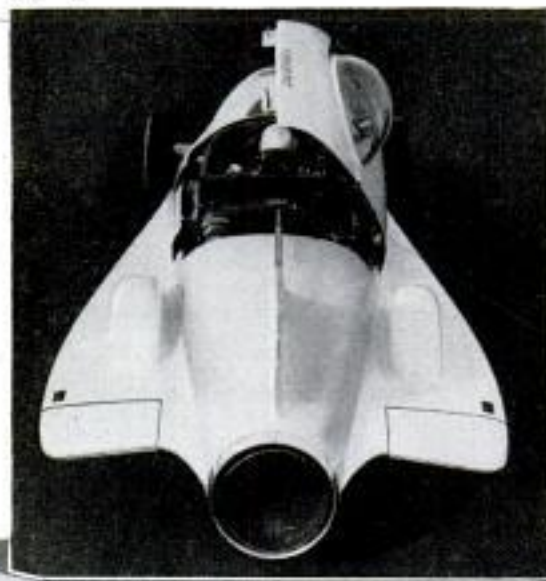


PLYMOUTH put its experimental plastic Belmont on a standard chassis with only minor modifications. **CHEVROLET**, below, is showing an unusual station wagon, the Nomad. Entire rear portion is "wrapped" in glass





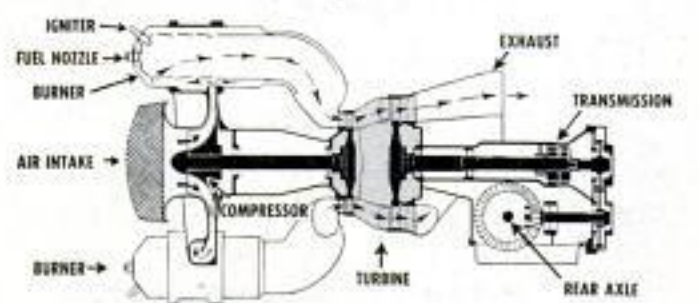
Above, Firebird's chassis. Below, huge exhaust pipe provides no thrust; rear wheels drive car



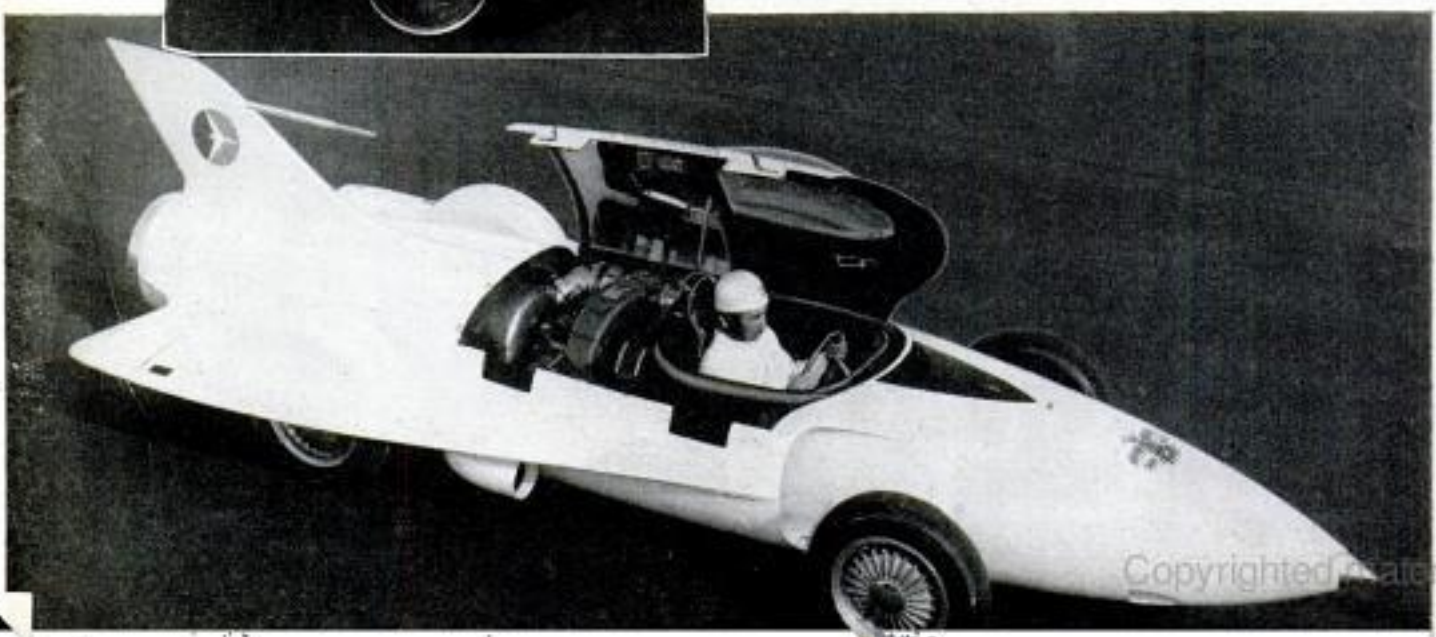
With 370 hp. driving only 2500 pounds, the car should "fly," but as yet its high-speed runs have not been revealed

GAS-TURBINE AUTO

YOU HAVE TO COUNT wheels to decide if the Firebird belongs on land or in air! Shaped like a jet plane, it is described by General Motors as the first gas-turbine automobile built in the United States. You won't see it on the highway today, tomorrow or, perhaps, ever. Strictly experimental, it is driven through the rear wheels, like your car, but instead of a reciprocating gasoline engine, it has a kerosene-burning gas turbine in which expanding gases spin a bladed wheel, much as wind spins a windmill.



Above, expanding gas from burners spins turbine and the power goes through two-speed transmission to rear wheels. Below, engine is behind driver who sits in a tiny cockpit



Buick's 1954 "Dream Car" Has Chrome-Lined Fenders

At this time of year, "dream cars" come out like tulips in spring (see bottom of page). Buick's 1954 Wildcat (not for sale) completes a cycle—front fenders are open, showing their undersides as did those on the Model T. However, the 1954 versions are chrome plated. Body is plastic, headlights are on cowl.



Two-Way Telephone Operates on Civilian Ultra-High-Frequency Band



Stewart-Warner Electric Div. photo

Weighing only 28 ounces, a new radio telephone transmitter-receiver operates on the citizens' band at 465 megacycles and has a range of about two miles. Its use requires no technical knowledge and any United States citizen over 18 can easily secure a license for the equipment. Both the microphone and the earphone are of the telephone type and are part of a case which fits the hand so that, in operation, the Portaphone may be used like a telephone handset. Radio signals are sent and received by a folding antenna that plugs into the top.

Sugared Poisons Kill Superflies

Three potent insecticides mixed with table sugar are reducing DDT-resistant fly populations by 90 percent within four hours. Malathion, diazinon and a dialkyl phosphate—all organic phosphate chemicals—are mixed with dry sugar and sprinkled in dairy barns and poultry houses. The method, developed by the Department of Agriculture, safeguards the health of livestock and humans and is low in cost.

Dodge Granada Has All-Plastic, One-Piece Body

Another 1954 "dream car" is Dodge's Granada, a low-slung convertible with an all-plastic, one-piece body, said to be the first in the industry. Previous plastic cars have been assembled from many separate parts. Even the bumpers on the Granada are plastic. It has a conventional Dodge chassis and a Red Ram V8 engine



The OWNERS

What Owners Say About the 235-hp. Engine—

"In case of a tight spot, I have additional power at most any speed." *Salesman, Kaukahee, Ill.*

"I have had to adjust my driving habits to a certain degree." *Welder, Chicago, Ill.*

"Added power is more dangerous. Seems to be no end to the top speed." *Contractor, Portland, Ore.*

"It seems to do everything without effort. There is no ping." *Retired Gunner, Buffalo, N.Y.*

What Owners Say About PowerFlite—

"It is wonderful except for the surge from one gear to another." *Salesman, Bronx, N.Y.*

"Sluggish on the low, low end, but it is fine beyond that." *Distributor, Decatur, Ill.*

"Very good except with a cold engine the car jumps when put in gear." *Salesman, Tunley Park, Ill.*

"Excellent but should have Park position." *Engineer, Valley Stream, N.Y.*



REPORT on the '54 CHRYSLER

The true test of a car begins when the owner takes the wheel. *Popular Mechanics* asked Chrysler owners from coast to coast about their cars. Here is what they say

By Floyd Clymer

BIG CARS AND HANDLING EASE don't usually go together. But Chrysler owners from coast to coast seem to agree that their cars are the exceptions. Well over half of the owners of the largest Chrysler models gave handling ease as the "best-liked feature."

That is a tribute to Chrysler's engineering and to such effort-saving devices as power steering and power braking. Chrysler's power steering is fast. The front wheels respond more quickly than they do on most small cars. That makes the car easy to handle, say the owners.

"So well balanced. Responsive."—Wheaton, Ill., broker.

"A pleasure to handle."—Winter Park, Fla., investor.

"Although my car weighs 4140 lb., it handles and gets around like a much smaller car."—Bennington, Vt., laboratory owner.

"Easy to handle in heavy traffic and in tight places. A dream to park."—Palatine, Ill., salesman.

"The over-all feel is very good."—Alden, Minn., merchant.

These are typical of the responses of owners of the large Chryslers. It is obvious that the cars handle well despite their size.

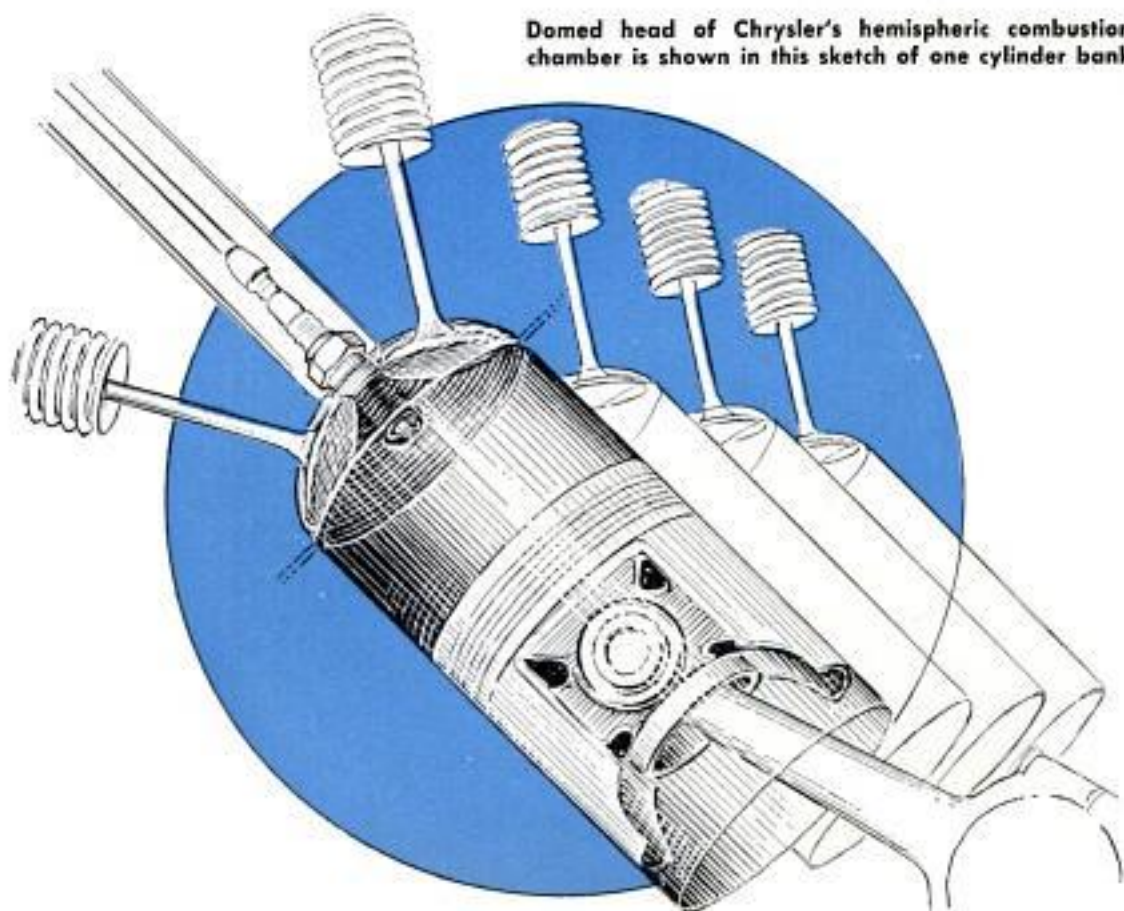
Of course, there are always exceptions. A Kankakee, Ill., sales manager writes: "The handling of the car is good with one exception. I find with power steering the car line in the center of the road 'throws' the car. On rough roads, steering is not as steady as I thought it would be."

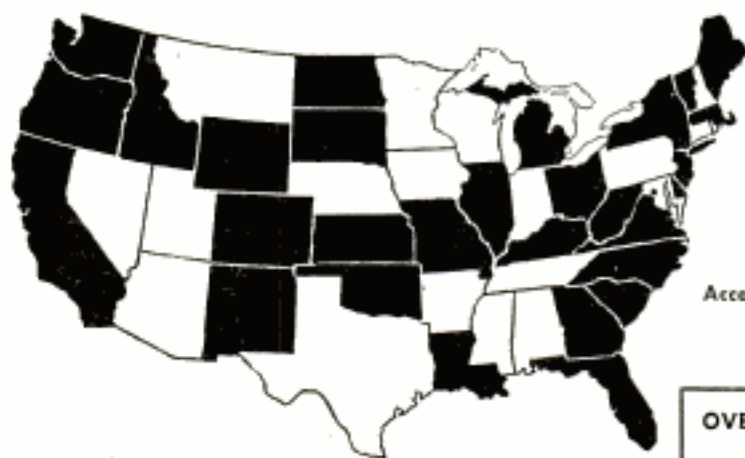
Best-liked feature among Windsor owners (the six-cylinder model) and second best among V8 owners is the comfortable ride.

"Big-car comfort at medium-car economy of operation."—Chicago, Ill., editor.

"I like the ride best. Chrysler builds a

Domed head of Chrysler's hemispheric combustion chamber is shown in this sketch of one cylinder bank





All types of weather and terrain are found in the 29 states from which owners report

Percentages from PM Poll of Chrysler Owners

ALL CHRYSLER OWNERS REPORTING

Previous Chrysler owners.....	67%
Owners of five or more Chryslers previously.....	22%
Owners rating of dealer service	
excellent.....	56%
good.....	25%
average.....	14%
poor.....	5%

Would buy another Chrysler?

yes.....	83%
might.....	15%
no.....	2%

Ratings on particular features

	Like	Acceptable	Dislike
Visibility, forward.....	94%	6%	0%
Riding comfort.....	92%	7%	1%
Visibility, rear.....	91%	9%	0%
Interior styling.....	87%	11%	2%
Exterior styling.....	71%	25%	4%

Chief purchase reasons (in order of frequency)

1. Previous Chrysler ownership
2. V8 engine and 235 horsepower
3. Chrysler reputation
4. Comfortable ride
5. PowerFlite transmission

CHRYSLER OWNERS BY MODELS

	Windsor	New Yorker	New Yorker DeLuxe*
Average miles per gallon			
city.....	14.2	12.1	12.0
country.....	16.7	15.2	15.0
Roadability			
excellent.....	76%	76%	82%
good.....	24%	22%	18%
unsatisfactory..	0%	2%	0%
Handling			
excellent.....	79%	90%	83%
good.....	21%	8%	17%
unsatisfactory..	0%	2%	0%
Structural rigidity			
excellent.....	57%	70%	78%
good.....	38%	28%	15%
unsatisfactory..	5%	2%	7%
Acceleration from zero			
excellent.....	62%	90%	82%
good.....	36%	9%	17%
unsatisfactory..	2%	1%	1%

	Windsor	New Yorker	New Yorker DeLuxe*
Acceleration from 50 m.p.h.			
excellent.....	49%	83%	81%
good.....	48%	15%	18%
unsatisfactory..	3%	2%	1%

OVER-ALL RATING OF THE CHRYSLER

	Windsor	New Yorker	New Yorker DeLuxe*
excellent.....	68%	75%	80%
good.....	31%	24%	18%
average.....	1%	0%	1%
poor.....	0%	1%	1%

BEST-LIKED FEATURES

Windsor owners	
Comfortable ride.....	53%
Handling ease.....	42%
Body styling.....	21%
PowerFlite transmission.....	20%
Performance.....	19%
New Yorker owners	
Handling ease.....	39%
Comfortable ride.....	38%
Powerful engine.....	23%
Performance.....	15%
PowerFlite transmission.....	13%
New Yorker DeLuxe owners*	
Handling ease.....	58%
Comfortable ride.....	37%
Performance.....	25%
235-hp. engine.....	18%
Dependability.....	10%

MOST FREQUENT COMPLAINTS

Windsor owners	
Poor gas economy.....	11%
Poor assembly.....	9%
Rattles and squeaks.....	8%
Rear-view mirror location.....	8%
Flashing-light dash indicators.....	6%
New Yorker owners	
Poor gas economy.....	15%
Sluggish pickup.....	6%
Rattles and squeaks.....	6%
Body styling.....	4%
New Yorker DeLuxe owners*	
Body styling.....	10%
Poor gas economy.....	9%
Rear-view mirror location.....	8%
Rattles and squeaks.....	8%
Owners with no complaints at all	
Windsor owners.....	35%
New Yorker owners.....	40%
New Yorker DeLuxe* owners.....	51%

*Includes owners of Custom Imperial and Crown Imperial models

car that is more comfortable, especially for tall people like myself."—Ridgewood, N. J., clergyman.

"Rides easy. Seats are high enough to be comfortable."—Louisville, Ky., salesman.

"Chryslers can take rough roads better than any car produced."—Ft. Jackson, S. C., soldier.

"Very little jarring on rough roads."—Glen Head, N. Y., businessman.

Handling ease was second among the features best-liked by the owners of six-cylinder Windsors.

But there are complaints too, of course. Owners of the 235-horsepower models (the New Yorker DeLuxe and the two Imperial lines) listed body styling as the most frequent complaint. Ten percent of the owners said they felt Chrysler styling was not what it should be.

"I do not like the body styling. Not up-to-date."—Tinley Park, Ill., salesman.

"Body styling can be improved. And should be."—Buffalo, N. Y., realtor.

"Body styling is behind other cars."—Miami Springs, Fla., secretary.

Most frequent complaint among owners of New Yorker V8 and Windsor 6 models is poor gasoline economy. Many of them blame the low mileage (see percentage chart for averages) on the PowerFlite transmission.

"Too much emphasis on horsepower, speed and gadgets. Too little economy of operation."—Milledgeville, Ga., physician.

"Getting only 15 m.p.g., which is very poor."—Palm Springs, Calif., retired officer.

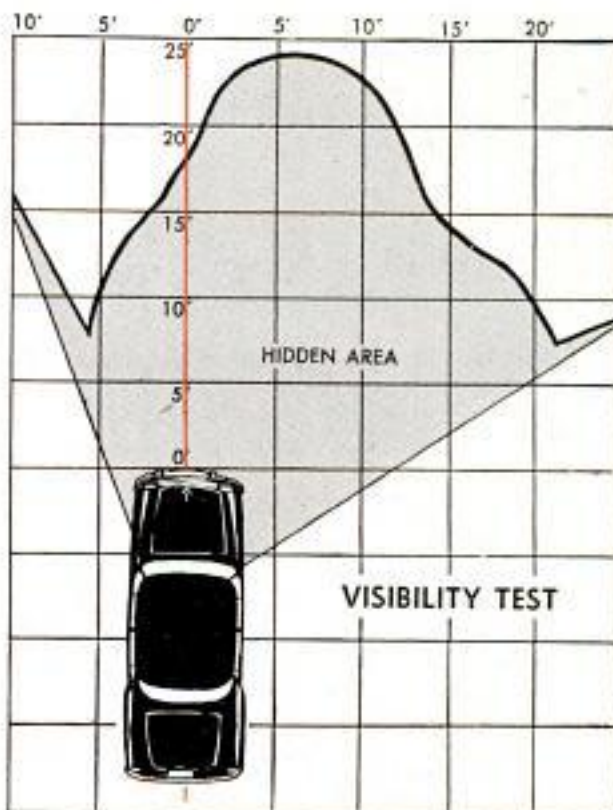
"Would love to return to the good old 20 miles per gallon. Personally I think the horsepower race is the worst thing that has happened to the auto industry."—Norwood, Ohio, foreman.

"Not up to expectation on gas mileage."—Louisville, Ky., construction worker.

However, there were many owners who couldn't think of a single thing to write under the complaint heading on the questionnaire. Of the New Yorker DeLuxe and Imperial owners, 51 percent failed to list a complaint; 40 percent of the New Yorker owners and 35 percent of the Windsor owners had nothing to complain about in their new cars.

What about 235 Horsepower?

All the V8 models have had a horsepower boost for 1954. The big Chryslers (New Yorker DeLuxe and the two Imperials) now have 235 horsepower, the highest rating in the industry. To find out what owners think about this power plant, *PM* asked them if they considered the added power safer or more dangerous. Ninety-five percent thought it was safer. Some of these had reservations, however, as did the Detroit,



Forward vision of driver from Chrysler is good. The shaded area shows portion of ground he cannot see

Mich., physician who wrote, "The added power is desirable if it is in sane hands."

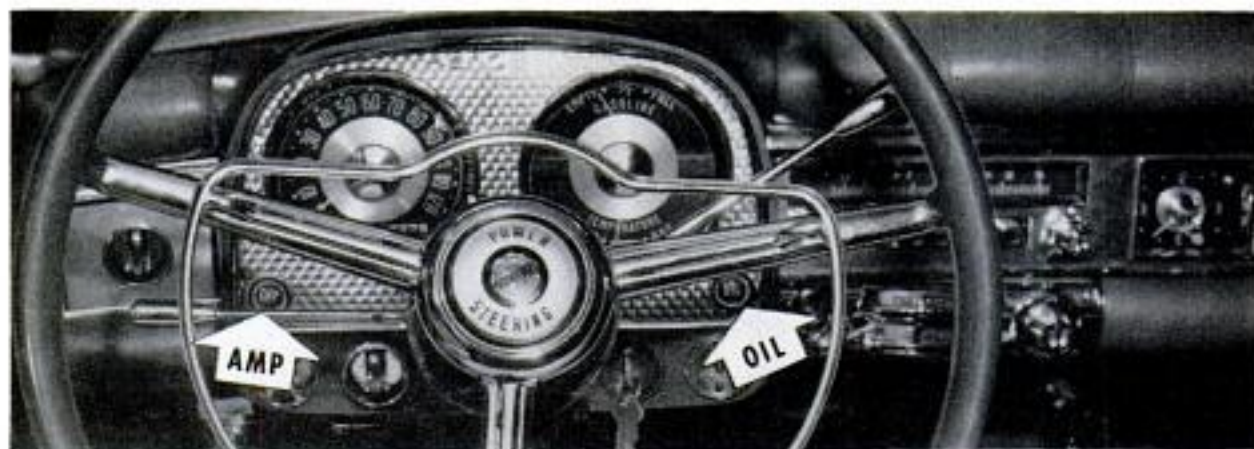
"I have the power when needed most, such as in passing."—East Rockaway, N. Y., salesman.

"Added horsepower is good insurance."—Arcadia, Calif., machinist.

"Quick acceleration is a lifesaver."—Illinois police chief.

Averaging 89.89 m.p.h. for 2157 miles at Indianapolis, a 1954 Chrysler set a new 24-hour endurance record





ACCELERATION TEST

1954 CHRYSLER NEW YORKER DELUXE
with PowerFlite Transmission

¼ mile from zero	19.9 sec.	Drive range only
	18.9 sec.	Low and Drive
½ mile from zero	31.2 sec.	Drive range only
	30.6 sec.	Low and Drive
0 to 30 m.p.h.	3.9 sec.	Low only
0 to 60 m.p.h.	14.1 sec.	Drive range only

Top speed by speedometer.....121 m.p.h.
Actual top speed about 7% less

ECONOMY TEST

MILES PER GALLON
Constant-Speed Mileage

At constant 30 m.p.h.	- - -	22.1 m.p.g.
At constant 50 m.p.h.	- - -	19.2 m.p.g.
At constant 60 m.p.h.	- - -	17.7 m.p.g.
At constant 75 m.p.h.	- - -	12.9 m.p.g.

Cross-Country Mileage

*From Los Angeles to Lake Arrowhead and return,
via Mojave Desert (mountain driving) - - - 16.2 m.p.g.

†From Los Angeles to San Diego, then to
Santa Barbara and return (traffic) - - - 16.6 m.p.g.

* Premium gasoline used

† Regular gasoline used



Chrysler now has flashing-light indicators for oil pressure and amperes. Many owners do not like them

What About PowerFlite?

Late last year, Chrysler introduced its new automatic transmission, PowerFlite, which has a torque converter and two planetary sets. It is apparently getting excellent owner reception because every one of the owners reporting in the PM Poll had PowerFlite in his car.

Almost without exception, the owners praised the new transmission.

"Amazing. After driving for 25 years, this is a new experience."—Grosse Pointe, Mich., physician.

"A little noisy in low and reverse, but smooth acceleration without jerk offsets this slight criticism."—San Diego, Calif., salesman.

"Wonderful, except for surge from one gear to another."—Bronx, N. Y., salesman.

"When passing gear is used by flooring throttle, the new V8 really leaps."—Lancaster, Calif., rancher.

"Far ahead of the Fluid-Torque used last year."—Los Angeles, Calif., attorney.

"Should have 'Park' position on shift lever."—Valley Stream, N. Y., engineer.

"Do not like transmission for city driving between 15 and 20 m.p.h."—Montclair, N. J., dentist.

"Transmission has a whining noise, especially in reverse, and vibration at speeds about 50. I would buy another Chrysler, but not with PowerFlite."—Detroit, Mich., machine operator.

"Car creeps. Hum from transmission, especially noticed when in rear seat."—Brookfield, Ill., contractor.

What are some of the other points about which Chrysler owners complain? As in all new-car surveys, there are some who complain of the poor assembly and the resultant water leaks and rattles.

"Rattles in doors and windows. General
(Continued to page 268)

Cowl-ventilator opening is controlled by foot lever under the dashboard. Lever came loose on test car



Front styling of the Kaiser is new. The Manhattan's variable-speed supercharger provides economy and power

Kaiser-Willys for 1954

Kaiser and Willys (products of the same company now) have increased power in 1954. Kaiser has a new front grille, fenders and headlights. The grille is concave and there is a matching smaller grille on the functional hood air scoop. Biggest news is a supercharger, standard on the Manhattan. It goes into operation in response to throttle position, loafing at low speeds to maintain gasoline economy. The Willys Ace has the Kaiser engine of 118 horsepower; the Lark, 90-horsepower F-head Hurricane engine.



Arrow points to belt-driven supercharger

	SHIPPING WEIGHT	WHEELBASE	OVER-ALL LENGTH	OVER-ALL WIDTH	FRONT-SEAT HIPROOM	REAR-SEAT HIPROOM	STEERING RATIO	TURN-CIRCLE DIAMETER	DISPLACEMENT	BRAKE HORSEPOWER AT R.P.M.	BORE AND STROKE	COMPRESSION RATIO	TORQUE RATING AT R.P.M.
KAISER													
DeLuxe	3210	118.5	214	75	63	63	25.0	38	226.2	118 at 3650	3.31 x 4.38	7.3	200 at 1800
Manhattan	3275	118.5	216	75	63	63	25.0	38	226.2	140 at 3900	3.31 x 4.38	7.3	215 at 2400
WILLYS													
Lark	2661	108.0	181	72	61	61	23.7	38	161.0	90 at 4200	3.13 x 3.50	7.6	135 at 1600
Ace	2778	108.0	181	72	61	61	23.7	38	226.2	115 at 3650	3.31 x 4.38	7.3	190 at 1800

Willys Ace has a new grille, larger engine, restyled interior. Automatic transmission is available this year





Early nickel-cadmium batteries failed in extreme cold. Sintered-plate type, frozen in ice, starts car quickly



Production is still slow and involves considerable hand work. Each cell is a transparent plastic case

Here's the Long-Life Battery

FOR TWO YEARS an ordinary-looking sedan has been tooling along the highways and country lanes north of New York City with a "secret" under its hood. Tucked in a space about the size of a breakfast-food box, there is a steel-jacketed battery containing five long, clean cells of clear plastic.

According to the owner, maintenance on his battery to date has amounted to a few drops of water once a year. "It can start my engine at 65 degrees below zero," he claims. "It will take a charge at that temperature, if necessary. But it won't be necessary often. It operates efficiently at 165 degrees above. Excessive running down, no matter how often, won't hurt it—30 minutes on a charger will have it back to total capacity. The automatic charger in the car can bring it up from complete discharge, in fact. And I never have to worry about overcharging it, because it won't take an overcharge. It will deliver power in any position—including upside down, if you enjoy driving that way." On top of all this, the gentleman promises that this particular battery should still be going strong in 1970—and maybe even 1980—long after the car it presently cranks is a dwindling heap of rust.

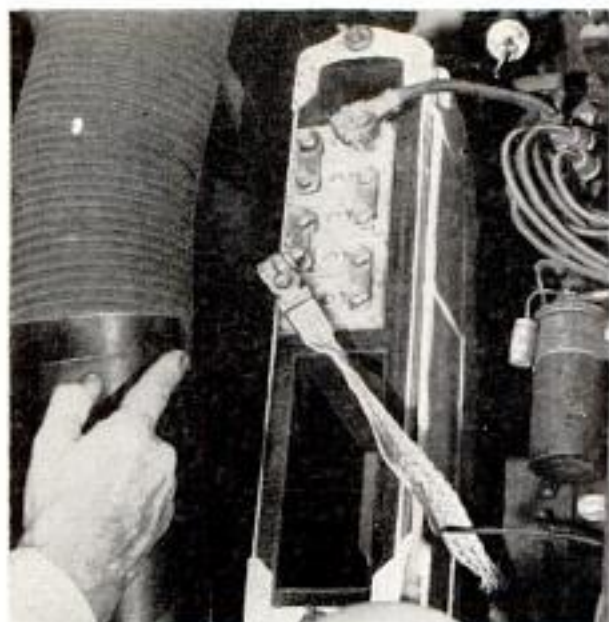
The car belongs to Dr. L. Grant Hector, director of technical operations for the Sonotone Corporation. The little power source is a new version of the nickel-cadmium-type battery, developed under the supervision of Dr. Hector for his company. And if all goes as planned, Sonotone expects that by the end of 1954 you and I will be able to buy the first automotive nickel-

cadmium battery mass-produced for consumer sale in this country. We'll be able, that is, if we have the price. In return for the 10 to 30 years of service it promises to deliver, the new nickel-cadmium automobile battery's initial cost will run between two and five times the present cost.

"But figured on a basis of cost per year over 20 years of life," says Dr. Hector, "it comes out on the bargain level."

While this is the first such battery ever mass-produced for American car owners, there's nothing new about nickel-cadmium batteries. More than 50 years ago two Swedes, Karl Berg and Waldemar Jungner, discovered that by using positive plates consisting of hollow steel tubes packed with nickel oxide, and negative plates of similar tubes in which cadmium compound was pressed, and an alkaline solution of caustic potash, they had a storage battery with some mighty interesting features. Since it used an alkaline solution instead of acid, they could put it in a rugged steel case. Its plates could not be damaged by overloading or total draining of its stored current. Furthermore, the battery worked year after year, showing no appreciable wear whether used or stored.

Because it was called a "pocket type" battery (due to the steel tubes or "pockets" in the plates), many people thought it was small enough to carry in a pocket. Actually it had to be two or three times the size and weight of a lead-acid battery designed to do the same job. According to some battery experts it didn't do too well in cold weather,



Nickel-cadmium battery is much smaller than lead-acid type, occupying only a fraction of battery rack

either. But for many industrial uses it looked good.

Until recently, most of the world's nickel-cadmium production has been aimed at industry, because of size, weight, price and other limitations of the pocket-type unit. Relatively few have trickled into automotive fields—especially in the United States.

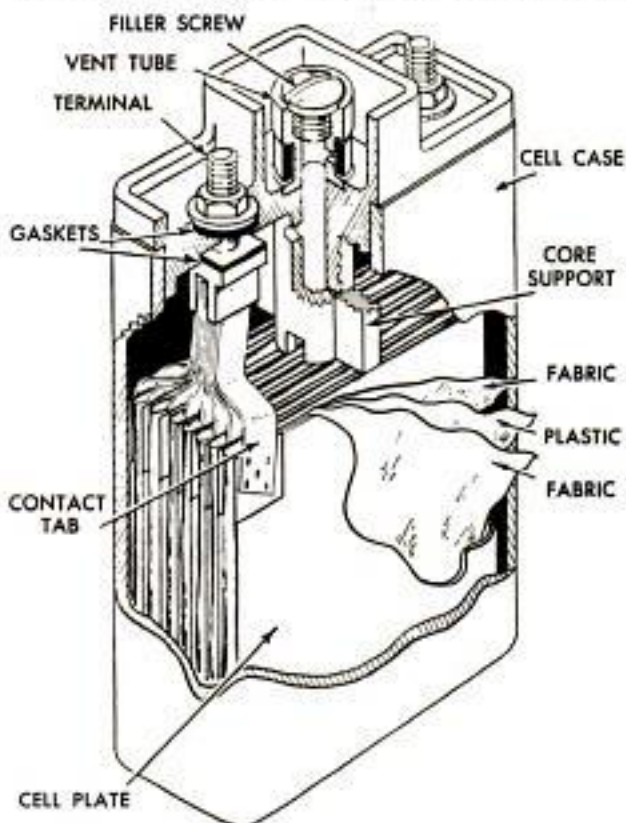
Those that have are adapted to places where size isn't too important. The same set of pocket batteries, for instance, have been turning up a fleet of Northeast Trailways intercity buses for the past seven years. They need water twice a year, instead of twice a day. Clarence Bruce, a Vermont fruit farmer, has one that's been running his tractor for four years. Prior to that, he bought a new battery each year. Now, at the end of the season, he puts his new one on a shelf in the shed, hauls it out again in the spring and off it goes. It cost him three times what he used to pay for each battery previously.

Carl Berg still owns an early pocket type nickel-cadmium battery that has seen duty in automobiles for 20 years. It has been shelved for more than a year, but will still start an engine.

Actually, Sonotone's battery (and a similar one being produced by SAFT in France) is made quite differently from the pocket type. It uses the sintered plates, which were invented by the Germans and first showed up in one of their fighter planes shot down over England early in World War II. Instead of using steel pockets for holding active materials, the grids of the battery are made by sintering nickel powder onto nickel wire mesh resembling the screens on your windows. It comes out a gray, metallic sheet that looks like a piece



Porous, sintered plate is secret of smaller battery. It was developed by Germans before World War II

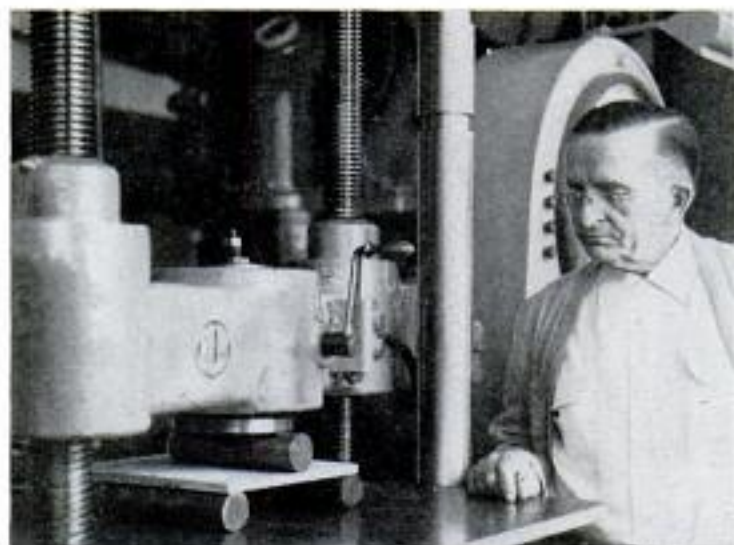


Sectional diagram of cell of nickel-cadmium battery

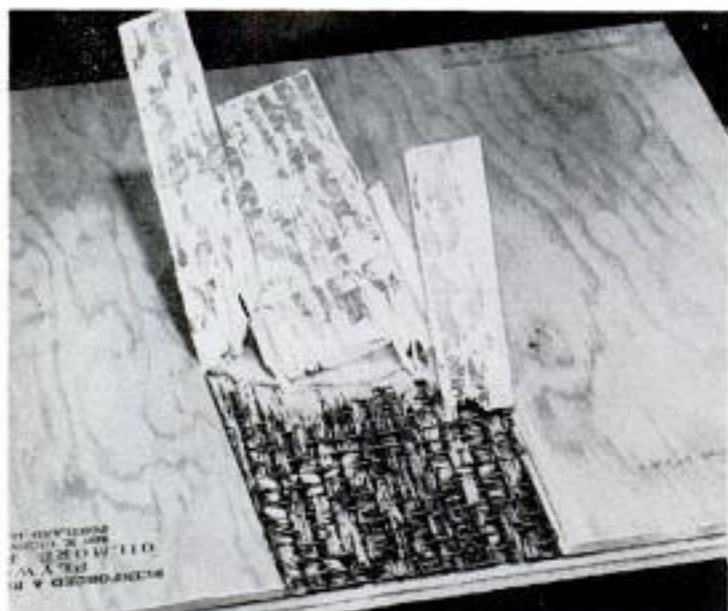
of emery paper, can be produced in huge quantities and cut to any desired size with snips. Nickel oxide deposited electrolytically in a grid makes a positive plate—cadmium, a negative plate.

"The new grid is as porous as a cinder block," explains Hector. "Hence, chemicals seeping through the holes have a huge area to work on. That's why we can make a much smaller battery do a much bigger job."

(Continued to page 252)

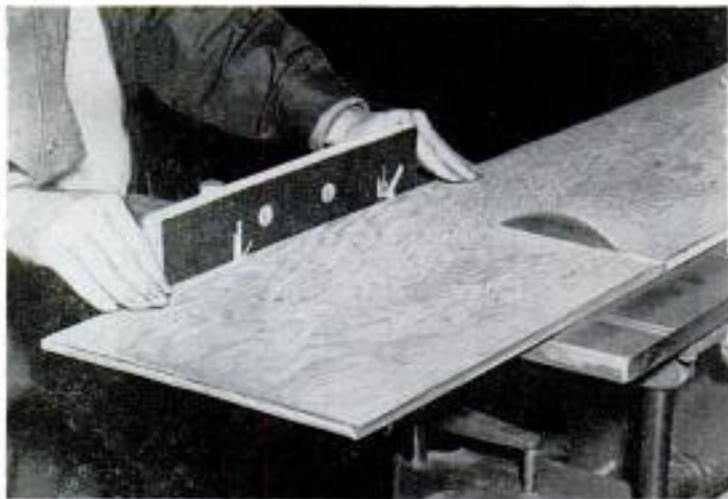


Gilmore watches a strength test of his panel at Oregon State College. Strength proved to be 10 times that of regular plywood



Gilwood after it has been ripped by 6500 pounds pressure in a nine-inch ring-test machine. Wire-mesh reinforcing is exposed in laboratory test. Reinforcing screen has one-fourth-inch mesh

Home craftsmen can work the wood easily with a carbide-tipped power saw turning at 4000 r.p.m. Wire layers don't hurt blade of power saw. Panel has many uses in "do it yourself" field



PLYWOOD

With an

IRON SKELETON

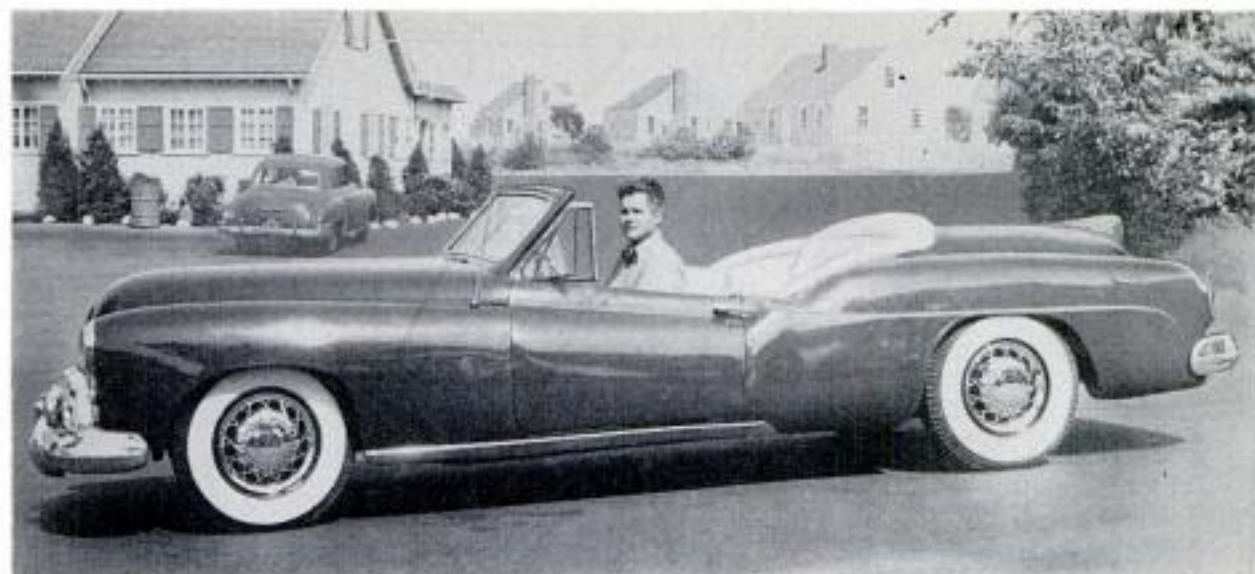
WIRE SCREEN bonded between layers of plywood gives tremendous strength to a new wood panel that may soon be on the market. Its backers claim that it will revolutionize the use of plywood in boats and buildings, as well as in packing crates, concrete forms, railroad cars and wherever exceptionally strong, lightweight panels are needed.

The process was invented by Roy E. Gilmore of Portland, Ore., as a result of his efforts to develop a ratproof grain-storage bin. Placing wire screen between the veneer layers of plywood resulted in a panel that was not only ratproof but unexpectedly strong. The development of carbide-tipped power-saw blades in recent years makes it possible to cut the wood-and-metal sandwich without dulling the blades. A home craftsman equipped with such a saw turning at 4000 r.p.m. can easily handle "Gilwood," says Gilmore. Gilwood is his name for the product.

The perfected panel is of standard fir plywood with a soft, black iron-screen core. The screen is like fly screen but of heavier wire and a larger, 1/4-inch mesh. Giving the wire a solid bond to the wood and glue is a sandblasting and coating process. No special machinery is needed to make Gilwood in regular plywood mills.

Tests with 1/4-inch Gilwood at Oregon State College showed its strength to be 10 times that of ordinary 1/4-inch plywood. Variation of strength throughout the panel is 8 percent instead of the usual 35 percent. The wire also stiffens the panels, reducing "give" and flexing. Gilmore states that 1/4-inch Gilwood is as stiff as 5/8-inch regular plywood.

One or two layers of wire mesh will suffice for many uses, but thicker plywoods can have the wire between any or all of five or seven layers, the latter giving exceptional strength for bridge and building trusses. Stainless-steel wire is planned for marine uses.



Low-Slung Custom Sport Car Built From 1948 Oldsmobile

With two years of spare time and \$2000, Paul Lauzon of Falmouth, Mass., changed a 1948 Oldsmobile 98 into a sweeping, low-slung sport car. His first step was to cut away the four-door body, beginning at the floor line, after which the floor itself was dropped two inches by channelization. Low clearance was effected by underslinging all coil springs three inches at the front and four inches at the rear. The body is cus-

tom welded, boxed in all the way around, of 16-gauge, cold-rolled sheet steel. The original front fenders were kept, but a 1941 Buick windshield, Buick rear fenders and a Henry J tail fin were used. The steering post was shortened six inches. Seats are foam rubber covered with plastic. Snap-on "wire wheels," white-sidewall tires and 12 coats of paint completed the job. Lauzon owns a professional body shop.

United States Airlines Set Safety and Traffic Volume Records

Scheduled airlines of the United States set a new safety mark of one fatality per 200,000,000 passenger miles in 1953, while flying a record 31,981,000 passengers over

domestic and international routes. The new safety record is compared to 1.8 fatalities per 200,000,000 passenger miles in 1952 and 2.6 fatalities in 1951.

Superheated Welding Rod Melts Stone and Concrete

Stone, concrete, tile and metal melt under the 8000-degree heat generated by a new arc rod which can be used with DC welding machines of 200 amperes or more. The process may be used to drill holes quickly in concrete to expose embedded pipe, to pierce rock for blasting preparations, or cut tile-chimney flues. The new rod creates its own arc, requires no ground and does not have to be struck on metal. A conventional welding machine and the new rods are the only equipment needed.



Normal respiration of the minute long-tailed shrew is 800 breaths a minute and heart-beat rate is 500 to 1300 times a minute, according to zoologists.



"Producers of ideas spread their activities across many fields . . . Kettering might have been satisfied to specialize in cash registers . . . Interested in cars, he licked the problem of a self-starter"

How to Produce New Ideas

By Webb Garrison

ALBERT A. MICHELSON is best known as winner of the Nobel prize in physics. He had many special interests, however. Among them was a passionate desire to solve the many riddles connected with flow of ocean tides.

At the height of his fame, the German-born scientist had a sudden "insight" that gave him a complicated equation for a group of tidal phenomena. It was not produced by trial and error, but flashed into his mind in complete form. When an expert mathematician on his staff arrived at a different result after days of hard work, Michelson refused to permit modification of his formula. Back at his desk, the mathematician found an error in his calculations, corrected it, and labored for hours to duplicate the radical new equation "given" to his chief instantly and effortlessly.

No one knows all that is involved in producing even the simplest idea. Aristotle investigated the subject of originality in the 4th century, B. C. The question has fascinated such diverse thinkers as Immanuel Kant, philosopher; Alfred North Whitehead, mathematician; Carl Jung,

eminent psychologist; and a host of others.

A hunch gave Johannes Kepler the first law of planetary motion; afterward it took him a month to verify it by mathematics. Archimedes did not discover the principle of specific gravity by experiment, but received it as sudden insight while taking a bath. Watt's steam engine made the industrial revolution possible, yet he got the idea on a Sunday afternoon stroll rather than while laboring in a machine shop. When many of the top inventors and scientists of America were questioned by the American Chemical Society a few years ago, 83 percent declared they receive assistance from sudden insight.

Evidence based on analysis of many cases indicates that four major streams contribute to development of significant new ideas. First, there must be eagerness to solve a specific problem. Second, the innovator must have an open mind on a variety of topics. Third, he must make conscious use of relaxation and change. Finally, the prolific inventor must work on numerous projects—must have "many irons in the fire."

Eagerness to lick a problem. On the surface, it seems strange to suggest that emotional fervor can contribute to originality. Yet numerous creative thinkers, especially in the field of mathematics, have mentioned this factor.

Newton received the law of gravitation as a flash of insight. Astronomical observations of 1666 gave results that seemed to disprove it. So he put his formula aside for a time and revived it only when new observations seemed to offer hope of confirmation. Newton was so intensely excited that he was incapable of making the necessary calculations and had to enlist the assistance of a friend. After solving any difficult problem, the great scientist usually felt a wave of emotion so keen he had to abandon work for quite a time.

Jacques Hadamard, noted mathematician at Princeton, flatly declared that strong emotion contributes to mathematical creativity. Henri Poincare, pioneer in study of light and electricity, echoed the sentiment. Bertrand Russell, an original mathematical thinker of modern times, once described insight as "exciting, like quick motoring." Kepler's diary includes numerous references to the strong exultation that accompanied his discoveries.

Charles Goodyear spent a lifetime perfecting treatment of rubber. Bell, Morse and Fulton were willing to push all other affairs aside in favor of their absorbing experiments. Edison could neither eat nor



"Westinghouse was too young to know it couldn't be done, so he invented air brakes for rail cars"

sleep when caught in the throes of creativity.

Almost without exception, the man who produces a new idea has attacked some problem in a spirit of burning enthusiasm. He not only wishes to work on his idea; he is actually incapable of turning it loose. He is so absorbed in his search that every other interest dwindles.

An open mind and keen curiosity. In a literal sense, "there is nothing new under the sun." Every development rests upon previous ones. Devices that we call new are only combinations of two or more old ones. Thus, the ax combines principles of the lever plus the knife. A few mechanical principles, familiar for centuries, were brought together into a radical new combination to perfect the rotary can opener—

which has made several fortunes. Far from starting in a vacuum, Mergenthaler had numerous conventional devices from which to develop the Linotype composing machine. His originality consisted in seeing relationships that had occurred to no one else.

That ability is the heart of invention and originality.

New ideas grow out of old ones by combination and amalgamation. Often the most diverse elements are brought together. Jack Ritty got the idea for the cash register by watching a device that counted revolutions of a ship's propeller. Eli Whitney linked the stripping of cotton seed with the

"Edison could neither eat nor sleep when in the throes of creativity. It was no accident he devised the phonograph in 24 hours"





Drawings adapted from
Hottmann Archives Illustrations

"Absorbing interest in many diverse problems marked the careers of men such as Morse, inventor of telegraph"

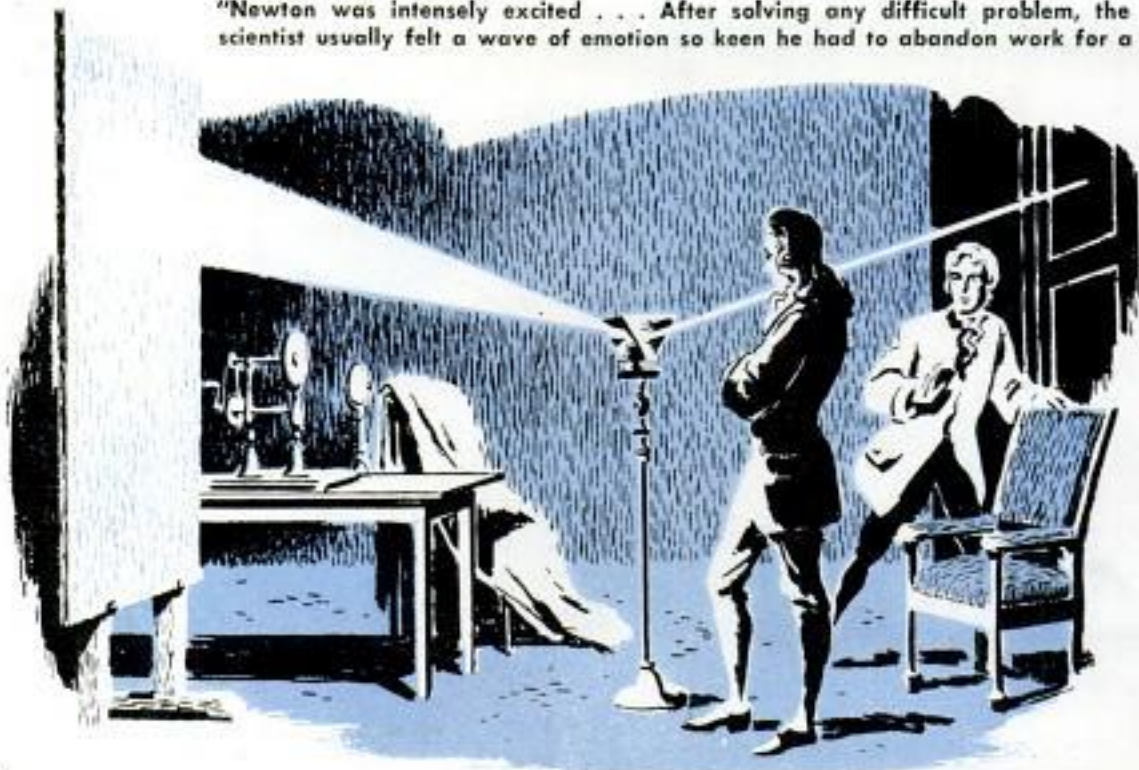
claws of a chicken-stealing cat to produce the gin. Newton arrived at the law of gravitation by comparing the abrupt falling of an apple with the perpetual falling of planets toward the sun. Einstein made a leap of thought connecting matter, space and time—to arrive at his theory of relativity. Diesel combined a few standard operations, previously regarded as unrelated, to provide a radical new motive power.

These original thinkers did not restrict their curiosity to a single, narrow field. Nor did they accept prevailing answers as final.

Much creativity is nipped in the bud by simple failure to preserve a seeking attitude. Any expert in a narrow field is likely to try to learn all the facts in his field. His mind may become so fully occupied with the old that there is no room for a new idea.

Veteran railroader that he was, Cornelius Vanderbilt *knew* it was impossible to stop all cars of a train simultaneously. Since hand-braking one car at a time was the only possible method, the old Commodore didn't bother to seek any other system. At 20, railroad passenger George

"Newton was intensely excited . . . After solving any difficult problem, the great scientist usually felt a wave of emotion so keen he had to abandon work for a time"



Westinghouse was too young to know it couldn't be done, so he invented an air brake that stopped many cars in a train simultaneously.

It is no accident that many major inventions have come from persons not closely linked with the field in which their originality bore fruit. Day-by-day routines are soon taken for granted. Only the most creative mind ever bothers to investigate the obvious.

In the railroad field alone, rank outsiders have produced many of the most important innovations. Moses Farmer, father of the electric locomotive, was a school teacher. Eli Janney, inventor of the automatic coupler, was a dry-goods clerk. Thomas Hall, originator of the block system, was a cloth manufacturer. And the Pullman sleeping car came from the brain of a cabinetmaker who had turned storekeeper.

To develop new ideas in your own field, set aside definite periods in which to analyze problems as though you were a rank outsider. Suppose you did not already know how to do a particular job; what avenue of approach might be made? If forced to work without standard tools, what devices could you adapt from other fields?

While cultivating an open mind, do not hold a check rein on your curiosity. If you become interested in a problem outside your area of specialization, investigate it. Perhaps that will require a process of learning; if so, all the better! Fertilized by an idea-germ from outside your own field, some piece of old knowledge may bear sturdy fruit.

It is significant that most major producers of ideas have spread their activities across many fields. Richard Gatling, inventor of the machine gun, was not a professional soldier but a country shopkeeper. He devised a steam plow, a rice-sowing machine and a screw propeller. Hiram Maxim, a better businessman than Gatling, made a fortune from his recoil-type gun. But it did not begin to exhaust his interests. Maxim tinkered in many lines and patented hundreds of products ranging from amusement devices to aircraft parts. He even devised a new way to bake beans.

Conversely, the father of fresh-frozen foods

"Goodyear spent lifetime in treatment of rubber"



holds more than 300 patents in the mechanical field. Clarence Birdseye was not content with revolutionizing the food industry. He has perfected devices ranging from a rapid-fire harpoon gun to a widely-used heat lamp.

Charles Kettering might have been satisfied to specialize in improving cash registers. While employed as an engineer for National Cash Register Company, he developed several patents in the field. But when a vice-president of the company was injured trying to crank his automobile,

amateur Kettering became interested in cars. He quickly licked the problem of a self-starter and went ahead to develop a system of ignition and lighting.

Prompted by eager interest in many things, Roger Bacon supplemented the usual studies of a medieval monk by dabbling in alchemy—and produced gunpowder. Georg Cantor studied mathematics from the standpoint of theological curiosity and became a trail blazer in the mathematics of infinity. Elias Howe's interests

"Bell was willing to push all other problems aside in favor of his absorbing experiments"



extended from watch-making to textile manufacture — then he jumped the traces to make a sewing machine for housewives.

Relaxation and change of pace. Enthusiastic, open-minded searching is necessary for originality. Conversely, a period of calm receptivity often pays tremendous dividends—provided it follows a sustained attack upon a problem. The human mind frequently produces originality in periods of relaxation after strong effort.

Many of Newton's mathematical discoveries came to him during sleep. Howe licked most problems of the sewing machine by persistent trial-and-error work, but failed when he attacked the needle. Eventually the right idea came to him in a dream.

John Rust, inventor of the cotton picker, found it easy to get lint on a toothed spindle—but almost impossible to get it off. He was lying in bed, almost asleep, when suddenly the idea of wet-operating a toothless spindle popped into his mind.

Frederick G. Banting was awakened from sleep by a hunch that led to the discovery of insulin. August Kekule, struggling with a problem of organic chemistry, became discouraged and sat down to take a nap. Dozing before an open fire, he began to dream of serpentlike atoms. At first they moved in twisting rows; then each took another's tail in his mouth and a ring was formed. Awakened by the dream, Kekule jotted down his revolutionary closed-chain theory of the benzene molecule's construction. His theory of atomic structure came to him while he was half-asleep on a crowded bus.

There is strong evidence that the mind transforms and modifies much of the raw material fed into it.

Stare at the drawing below. Slowly at first, then more rapidly, the figure will alternate between two and three dimensions. Such shifts of the mind cannot be prevented by any amount of will power. It appears that the mind is ceaselessly at work modifying and transforming the data fed to it by the sense organs.



"Michelson had a sudden 'insight' that gave a complicated equation for tidal phenomena"

Such mental processes seem to continue, at least in part, during periods of relaxation and even sleep. Given an absorbing problem and protected from distractions, the mind tends to find a solution at some level below consciousness.

Many psychologists attribute sudden "illumination" to such a problem-solving process. There are many indications that the mind moves in the direction of order and unity. Given an incomplete or lopsided geometrical figure, the mind tends to alter it in the direction of com-

pleteness and symmetry. Not content with cluttered shelves, the mind seeks to reduce its stock of goods to neat compartments.

As related to the psychology of invention, this means that there is a definite tendency to bring order and form out of any mass of data pertaining to a problem. During hours of intense conscious effort, such movement by the mind is inhibited. Relaxation gives the mind freedom to operate—with the result that a "flash of intuition" may come to a person so vividly and suddenly that it is actually startling.

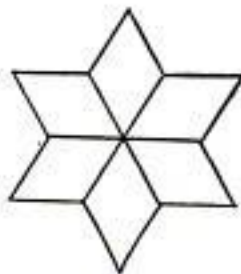
After reaching a dead end in any problem, deliberate change of pace may yield inspiration. Even a stroll or a nap may be effective. In no instance does relaxation alone produce ideas; it has virtue only as a change of pace following hard work and strong concentration on a problem.

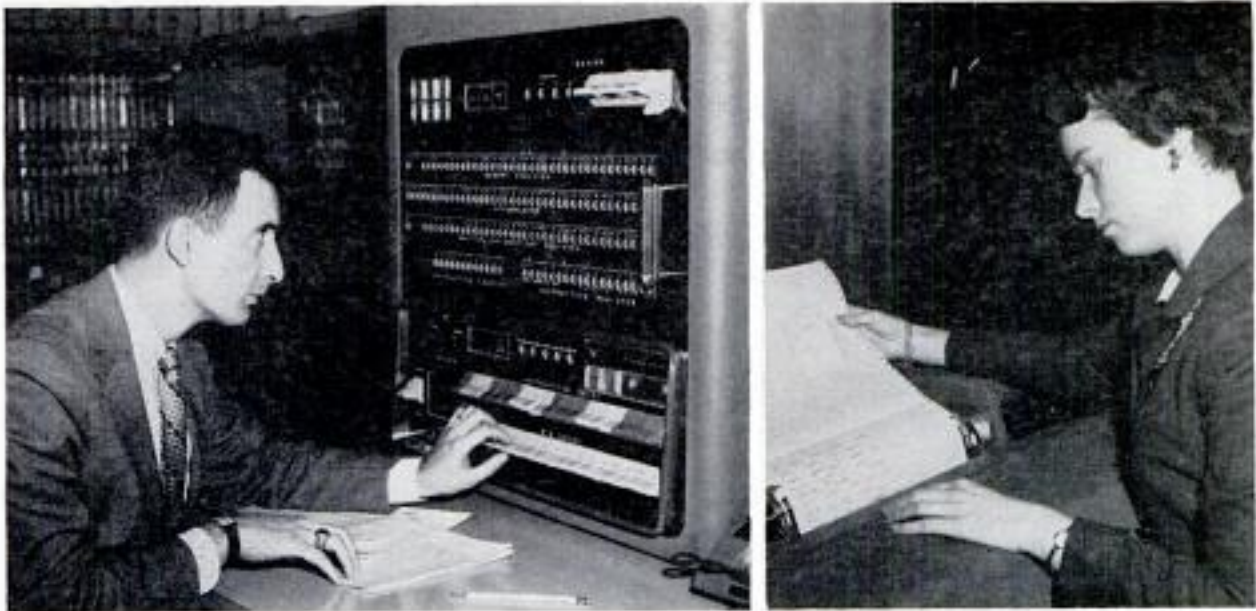
Many irons in the fire. Some problems are solved rapidly—Edison created the phonograph in one day. Other puzzles resist solution for long periods. Whether original ideas come rapidly or slowly, they apparently are produced in direct proportion to the number of problems attacked.

Effective originators do not restrict their interest to a single problem. Rather, they keep many undertakings in progress simultaneously. Here is a problem almost at the point of solution; there is one that has not yet passed beyond the stage of framing a rough question. By working on many ideas at once, valuable by-products from one line of investigation are likely to help the progress of another.

It was no accident that Edison perfected the phonograph within 24 hours of starting to build it. Months earlier, he had failed in

(Continued to page 230)





One man supervises machine. English translation unreeals from printer, seconds after Russian is fed in

Electronic "Brain" Translates Russian Sentences Into English

RUSSIAN is translated into English by an electronic "brain" at Georgetown University that normally busies itself with nuclear physics, trajectory-plotting and weather forecasting. A girl who doesn't know a word of Russian punches out the foreign words on a standard IBM machine. The punched IBM cards are then placed in a reading unit. Guided by six basic rules of syntax and grammar, the "brain" searches through its 250-word vocabulary of English equivalents, frames them into a sentence and prints the translation seconds later. Code numbers to various words govern necessary changes like reversing word order, choosing between two meanings and adding connectives. Within five years, it is predicted, such a system will be practical for translation of several languages.



Sentences in Russian are punched on standard IBM cards for feeding into processor for translation

Russian sentence "Obrabotka povyshayet kachyestvo nyeftyi" is punched and printed on card for translation

OBRABOTKA										POVISHAYET										KACHY ESTVO										NYEFTYI									
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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IBM 733727



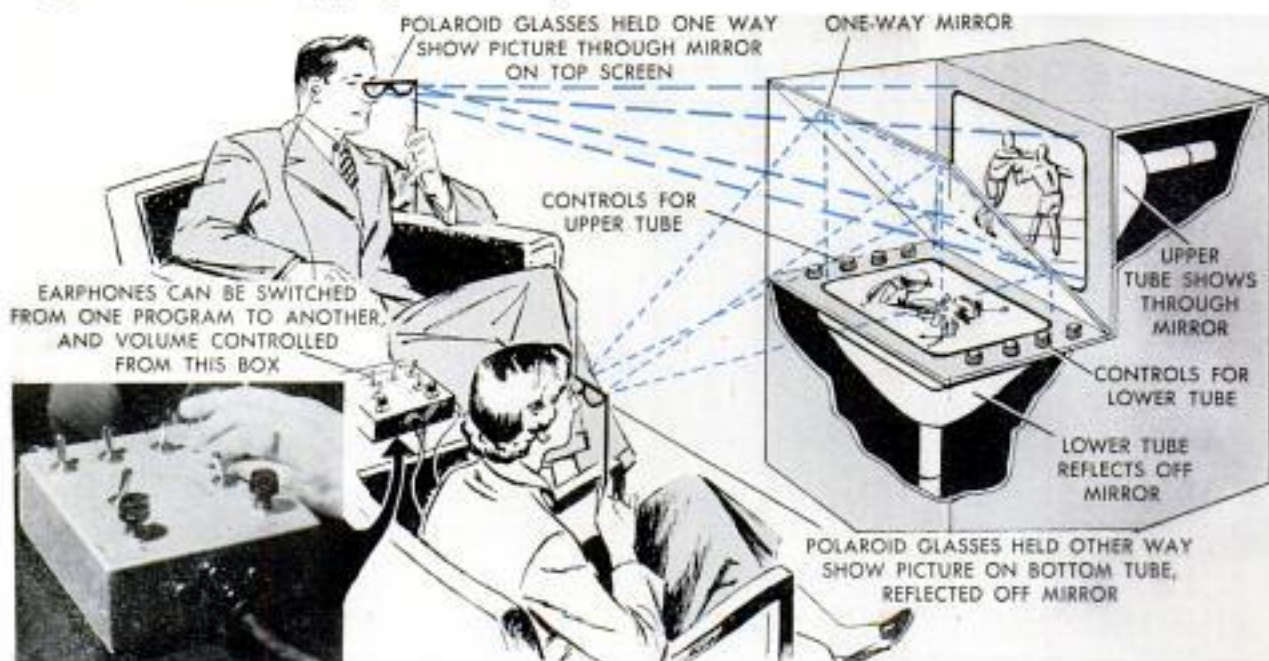
Watching two different programs on same screen, viewers look through Polaroid windows which divide images

TV Set Shows Two Pictures at Once (It's Done With Mirrors)

DU MONT ENGINEERS are showing off a "double headed" TV set that enables two persons to watch two different television shows on the same screen. The set is actually two receivers in one. One cathode tube in front faces upward. The other is horizontal in the rear of the cabinet with its screen facing the viewer. Between the two tube faces is a slanted mirror which passes light waves from the rear and reflects them from the front. Viewers wear

button-size hearing-aid-type receivers. The mixed images are separated by Polaroid glasses or Polaroid filters placed on stands in front of the screen. One position of the glasses or filters gives the picture on the rear tube. Reversing the position brings in the other picture. With the set, a husband and wife can sit side by side and watch the TV fare they most enjoy. Military men can watch close-ups or long-range pictures of maneuvers.

Diagram illustrates working principle of the unique set. Inset shows switch box that controls channel and volume



Detroit Listening Post



By Leo Donovan

A MAJOR CAUSE of irritation for motorists soon will disappear. The slow-starting truck that holds up long lines of rush-hour traffic at stop lights soon will surge ahead as fast or faster than the average passenger car when the light changes.

Engineers at GMC Truck & Coach Division of General Motors have developed a 21-speed transmission that enables heavily-loaded commercial vehicles to accelerate from a standing start with alacrity.

Extensive tests have satisfied the engineers that the new transmission (fully automatic) is ready for introduction. You can expect the announcement this spring.

Improvements in the production of automobile windshields in the past nine years have been even more spectacular than the "panoramic view" the salesmen elocute about. Why the glass manufacturers have been so quiet about their accomplishments is a puzzle. Highly complicated machines had to be developed to polish both sides of sharply curved glass simultaneously. Fisher Body engineers, for a long while, were afraid that even if the panoramic windshield could be produced, it would be precarious business trying to fit it into a windshield frame. Now workers use heavy rubber mallets to hammer it into place with scarcely an accidental crack in thousands of fittings. Actually, the panoramic windshield is astonishingly flexible.

The American Motor Car Co. (Hudson-Nash combination) is going ahead with production of the little NKI car that George Mason announced when president of Nash-Kelvinator only. The small cars are being entirely built in England for Nash. They come to this country complete and ready to roll and are, advance notices state, as neat a combination of the advantages of big and small cars as you have seen. The car is very, very small—but very, very good looking.

It started out as the NXI, then became the NKI (for Nash-Kelvinator International), but as of this writing is nameless! Officials are not happy with the three-initial

name (which is familiarly known as Nicky among the Nash family) and are looking for an appropriate new one.

The newest of the Nash family will be announced around the middle of March. It will be available both as a full convertible and a hardtop.

What's the prospect of the gas turbine replacing the familiar piston engine in the next 10 years or so? The GM Firebird (see page 90) prompts such a question. The answer: Practically nil, say most automotive engineers.

It isn't that the technical problems are insurmountable. Even the very-high cost of operating gas turbines at the comparatively low speeds required by today's highways may eventually be reduced. There are other problems.

The gas turbine has plenty of economic opposition, including the big investment in gasoline-producing facilities. The trend toward higher compressions has forced the gasoline companies to invest millions in the production of high-octane gasoline. The turbine burns kerosene and wide-scale use of it would make the petroleum companies shut down much of their equipment.

We'll also have to spend billions in the years to come to bring our highways up to where they will handle the speeds of present-day reciprocating engines. What would it cost to prepare them for the gas turbine?

Buick will introduce a convertible in the new Century line this spring or summer. It will have an even lighter body and the most powerful Buick engine.

Here's an interesting theory advanced by an automobile dealer who believes that many owners pay too large a part of their incomes for cars!

Why not, he asks, sell a form of insurance that will provide the policyholder with everything except the gasoline? Maintenance, replacement of worn parts and future trade-in could be taken care of under the policy.

The amount of the premium would vary according to the type of car the policyholder wants. He could even buy a policy on a used car of a certain value. All repairs would be included in the premium. Thus the policyholder wouldn't have to worry about the cost of extensive repairs on a used car he buys.

The policy could be a "three-year renewable" or a "five-year renewable" or "renewable annually." This would give the policyholder a new car every three years, five years or annually, as he selected when buying the policy. All costs, including license, insurance and perhaps even garage facilities, could be included.

And, if today's trend continues, it might be well to include a place to park it!



Longest trench ever to be explored by archeologists is this 1056-mile pipe-line ditch in the Southwest



Bulldozer pushes away rubble and drifted sand before archeologists take over with a whisk broom
International Harvester Co. photo

PIPE-LINE Archeologists

By Elmer L. Weaver

TWENTY-TON bulldozers seem strange tools in the hands of archeologists whose traditional implements are the trowel and whisk broom. Yet, a half dozen scientists became experts with the big diesel-powered machines and with all types of modern construction equipment as they cleared ancient relics from the path of a "Super Inch" pipe line from Texas to California. This \$175,000,000 line will carry natural gas to the power-hungry industrial areas of California from new oil fields near Midland, Tex., 1056 miles distant.

This pipe-line construction was not only the biggest single project in 1953, it was also the most urgent. The oil producers drilled new wells madly following the discovery of these fields. No pipe line was available to carry away the tremendous volumes of gas that accompanied the oil; so the gas was wasted in huge burning flares. Texas authorities halted production in March, 1953, until this gas could be diverted to a useful purpose and the oilmen lose a fortune every day they wait for such pipe lines to go into operation.





At the archeologists' beck and call were units like this Army truck fitted with compressors and drills

Archeology entered the picture when Dr. Jesse L. Nusbaum, senior archeologist for the National Park Service, pointed out to officials of the El Paso Natural Gas Company that the route of the line went directly through areas littered with relics of prehistoric peoples. These would be destroyed and he requested that competent archeologists excavate and study them before the line was put through. The company cooperated and placed six scientists on its pay roll; it also offered the use of any equipment and men they needed to speed the work and keep ahead of the rushing construction crews. They went even further and supplied funds to publish the reports when the job was finished. The company asked only that archeological work not interfere with construction schedules.

The archeologists went to work immediately following the surveyor crews, who staked out the right-of-way. The entire 1056 miles had to be walked to locate any sites indicated by evidence on the surface. Then these sites were excavated and, finally, the whole distance walked again—this time in the deep trench made to hold the big 30-inch steel pipe. The smooth trench walls revealed sites hidden on the surface by drifted sand and the debris of centuries.

When the actual construction got under way early last August,

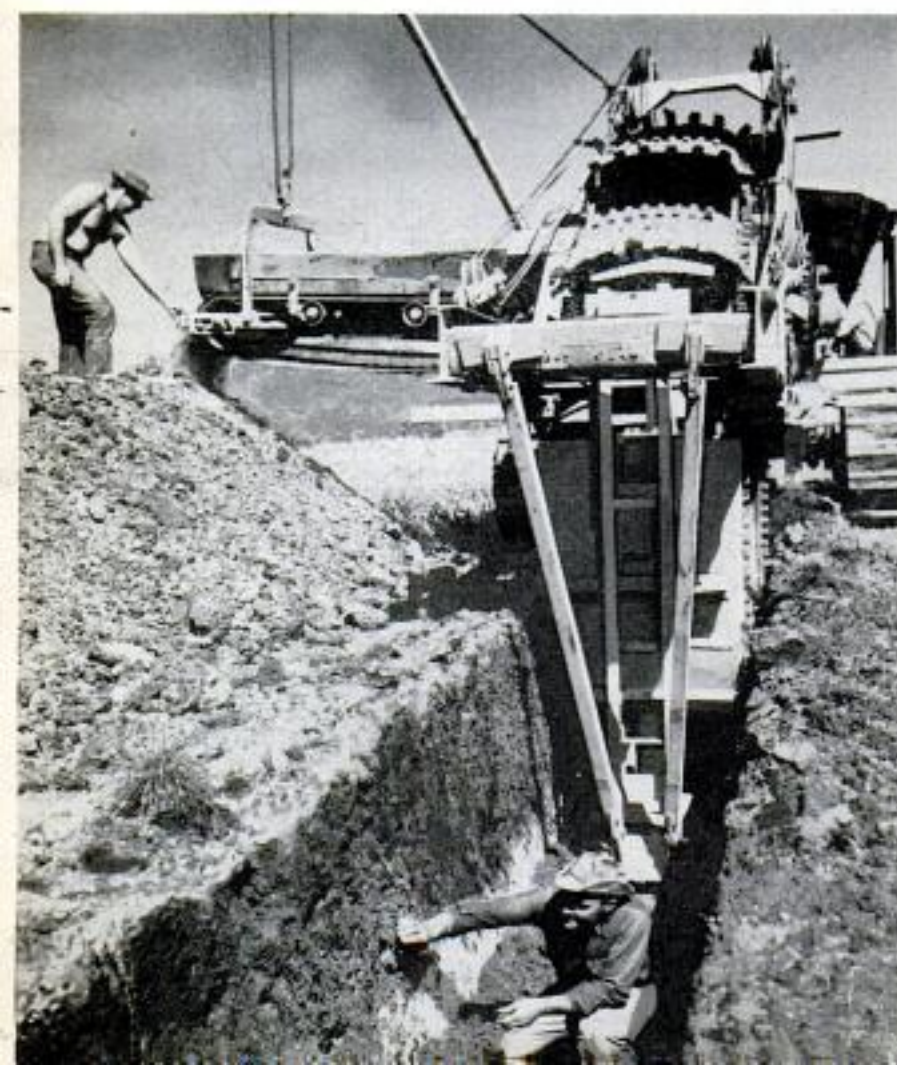


Above, after artifacts have been removed from excavation, a map is made of site for files of Laboratory of Anthropology in Santa Fe. Below, model of early apartment house typical of the kind of dwelling unearthed by pipe-line archeologists





While one archeologist assumes position of an early Indian girl grinding corn, a teammate photographs the scene. Below, many pipe-line workers, like the man in ditch, turned amateur archeologists to aid scientists in search for ancient relics



the archeologists frequently had to perform all of the above jobs at the same time. They set up an Army-type command post in Santa Fe, N. M., and by using two-way mobile radio and the long-distance telephone, kept in touch with activities along the pipe line. The reconnaissance work was interrupted many times so they could dash back to rescue a site threatened by the onrushing pipe liners. Using bulldozers saved them days of hand digging by skimming off rubble and sand dunes that had drifted over the sites but, even then, midnight often caught them finishing an excavation by the lights of the Jeeps so the pipe line could proceed on schedule the next morning.

The pipe-line construction men became interested and began to take an active part in the work. When they came upon sites overlooked by the hard-pressed scientists, they would steer their big machines carefully so as not to disturb anything until the scientists arrived. Every large excavation took on the atmosphere of the classroom as pipe liners gathered to watch and the professors explained the finds. They all helped and several left higher paying jobs to join the archeologists for the duration of the project. The search for ancient history changed a routine operation into an adventure.

The archeologists used the pipe-line project to make a cross-section study 60 feet wide, 1056 miles long and containing a sampling trench seven feet deep so they could also see what lay beneath. No private sponsor could ever provide the funds for so vast a survey across the paths of the first Americans. More than 300 ancient sites have been salvaged on the right-of-way for the El Paso Natural Gas Company lines. Each had added its bit of information to the incomplete jigsaw puzzle that is our total knowledge of early man in America. Some day this picture will be complete with every piece in its proper place. The El Paso Natural Gas Company is doing a great cultural service in establishing a precedent that others may follow. The big machinery that has destroyed so many antiquities in the past can help preserve them in the construction projects of the future.

★ ★ ★



Underwater Bike Propels Submarine Swimmer at Rapid Rate

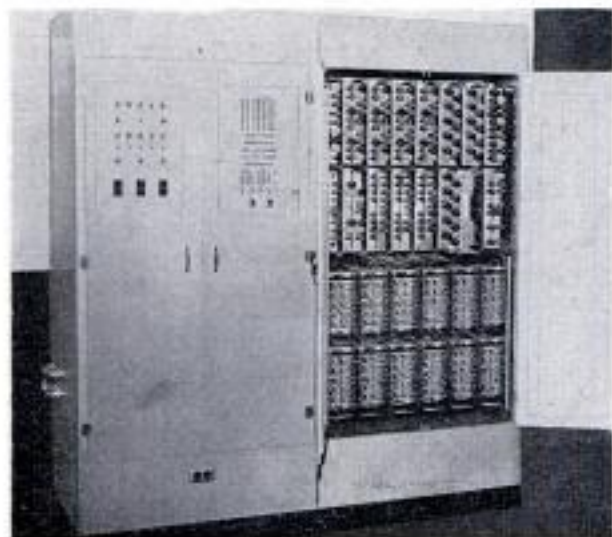
Underwater explorers can scoot about rapidly with a new "underwater bicycle." The device consists of a large metal tube strapped to the swimmer and fitted with a

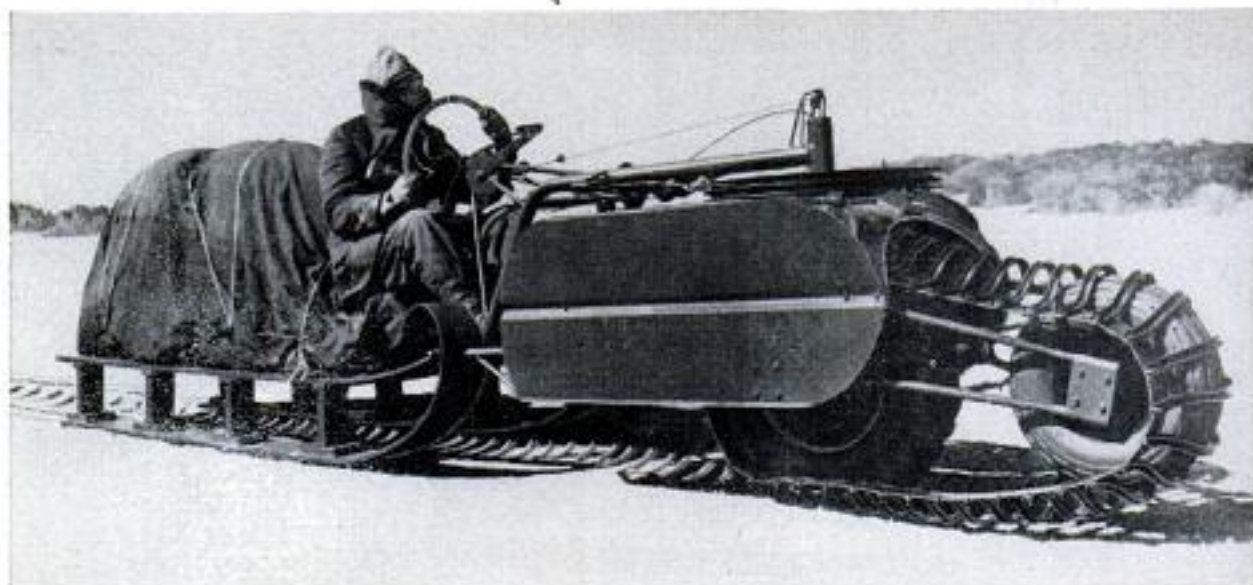
propeller driven by foot pedals. The pedals are rotated just like a bicycle's. The bike was originally designed for use by Navy frogmen.

Whirling Magnetic Drum Classifies and Remembers Mail Orders

Incoming orders are instantly classified, recorded and totalled by a new electronic and magnetic "brain" which does the work of 39,000 adding machines. It is believed to be the first electric computer specifically designed for business purposes. Dubbed the "Distributon," the instrument was built by Remington Rand for John Plain & Company, a mail order firm which receives up to 15,000 orders a day. Ten girls operate keyboards to send information to the "brain," which instantly records the quantity, the code number of the item, and adds the quantity to the previous total. The information is sorted into 39,000 classifications and "remembered" by a magnetic

drum, which constantly revolves at a rate of 1750 revolutions per minute. The surface of the drum is magnetized in tiny spots to record the information. If an executive wants to know the total orders for a particular item, one of the 10 operators simply punches out the item number and the desired information is available in three-tenths of a second. The machine will give a visual reading on a dial, print or punch the information on tape or punch it on a card. The 10 girls working on the keyboards at top speed can't match the capacity of the machine. Most common errors, such as transposing two digits, are eliminated, as the machine refuses such obvious mistakes.





American "Snowmobile" Ends Need for Dogs in Arctic

Eskimos can now dispense with dogs and cruise over the snow in a motorized sled. A "snowmobile" manufactured by a United States firm is driven by a six-horsepower engine that can be detached in three minutes and carried inside to keep it warm

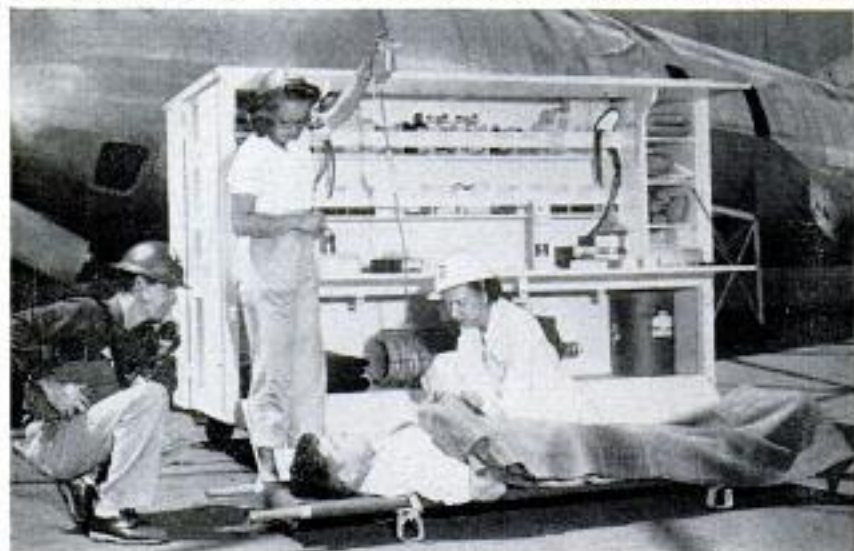
for starting. All parts are built to operate at 65 degrees below zero. Two wheels in front are connected by an endless tread for good traction in snow or ice. The sled is designed to carry 1000 to 2000 pounds in rough terrain.

Six-Second Loader For Spraying Planes

Featuring a beam-hung hopper, a machine developed by a New Zealand aviation firm shoots a ton of fertilizer into a spraying airplane in just six seconds. It reduces the time between touch-down and take-off with a full load to as little as two minutes. Two planes, working in relays over New Zealand's mountainous areas, can spread 200 tons of fertilizer in three days.

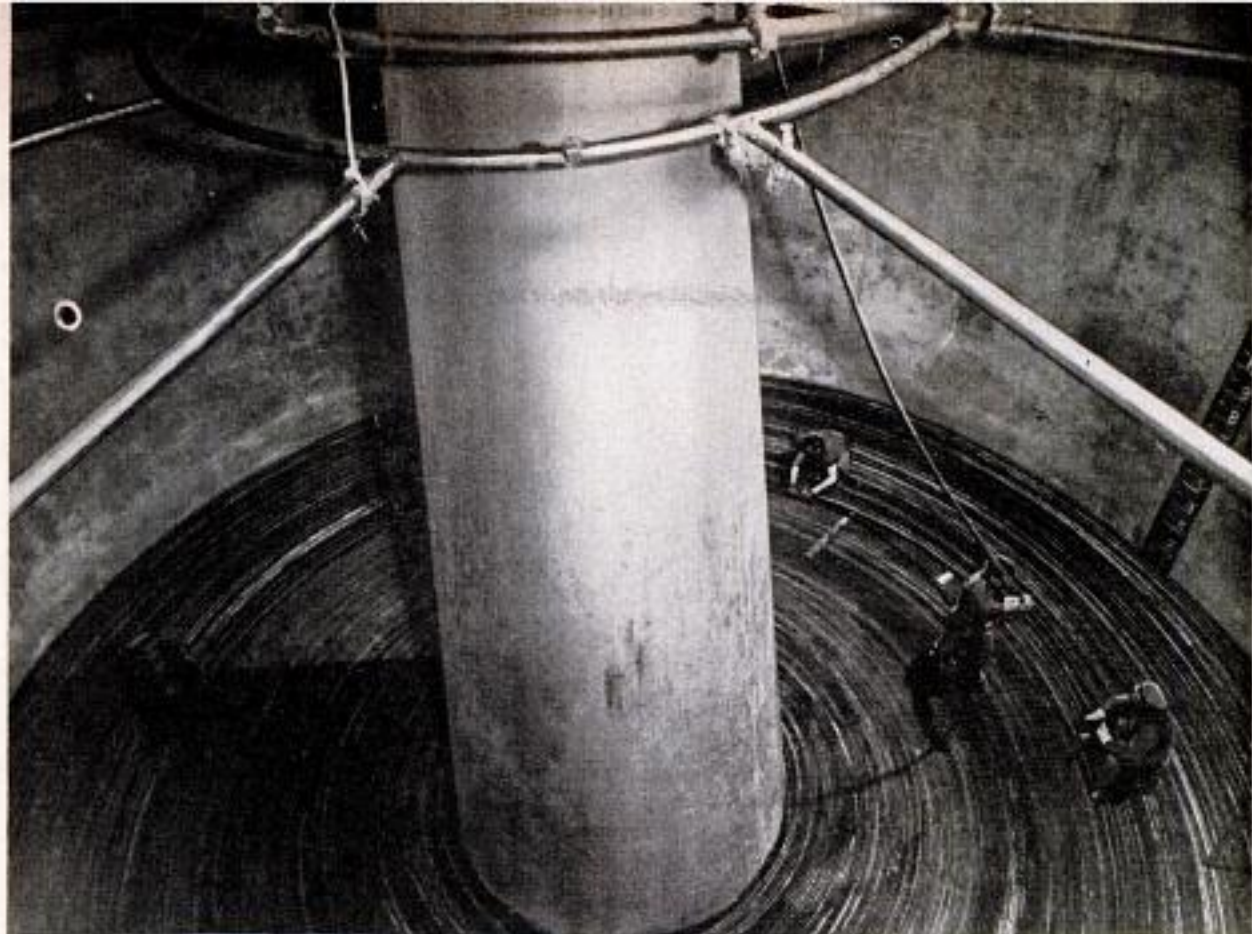


Aircraft Plant Installs Wheeled First-Aid Stations



Mobile first-aid stations are kept outfitted and ready for all emergencies at the Consolidated Vultee Aircraft Corporation's San Diego, Calif., plant. Attendants rehearse their assignments during each of the frequent civil-defense drills.

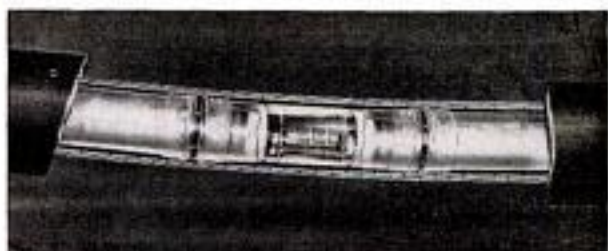
Palomar Mountain's 200-inch Hale telescope is powerful enough to detect the flame of a single candle 18,000 miles away, according to the National Geographic Society.



Careful loading of cable on ship takes weeks. Deep-water cable is 1½ inches thick, shallow cable is 2½ inches

Begin First Telephone Cables To Connect the Hemispheres

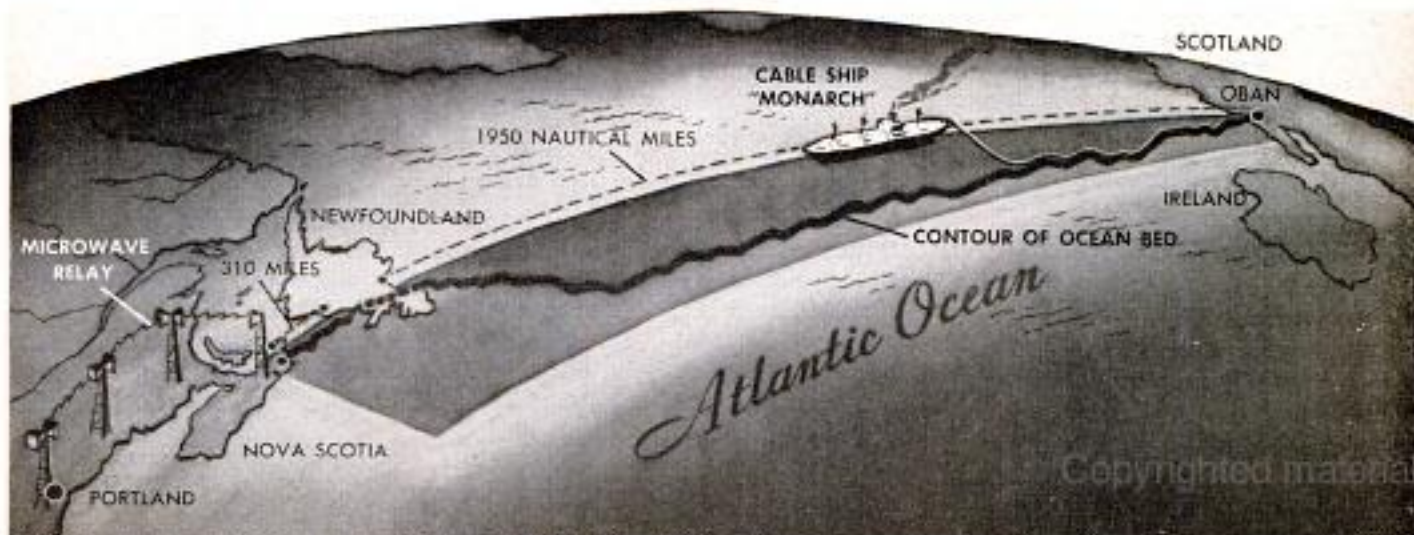
AMERICA and Europe will soon be linked by the first trans-Atlantic telephone cables. Although the first successful telegraph cable between Europe and America was laid in 1866, this will be the first telephone line to cross an ocean. It will supplement the present 14 short-wave circuits and is due for completion in 1956. Two thin cables will be laid separately on the ocean bottom for 1950 nautical miles between Oban, Scotland, and Newfoundland. An underground cable crossing Newfoundland will connect to an additional 310 miles of single submarine cable between Newfoundland and Nova Scotia. From there, messages will be



Every 40 miles cable swells to four-inch diameter. A seven-foot row of tiny amplifiers boosts current

carried 350 miles by microwave relay to Portland, Me. The Atlantic link will have 100 amplifiers, each with three vacuum tubes, housed in flexible copper tubing and built into each cable as a tapering bulge that will pass through the ship's gear as the cable is unreeled into the water. The \$35,000,000 line is being laid jointly by A.T.&T., Canadian and British interests.

British cable ship "Monarch" will lay line on uneven ocean bed, which in some places is 15,000 feet deep





Hot Rod Magazine photo

Jimmy-engined glass-fiber sports car (at left) takes off on an acceleration run at a California drag strip

"JIMMY" Engines for Extra

By Ewart Thomas

THE NEVADA RANCHER had one of the fastest stock cars on the market and you can imagine his surprise when a Chevrolet breezed past him on a desert highway. The rancher put his foot down to the floor but he didn't have a chance. The Chevy was still going away when it disappeared around a curve.

Later he spotted the same car at a cross-road lunchroom and he pulled up alongside. "What are you using for a power plant," he asked, "an Indianapolis engine?"

"Nope," the owner answered, "I have a rebuilt 'Jimmy' engine under the hood. Gives me a top speed of about 120 miles per hour."

Out in California, Joe Rego put a Jimmy engine in his Chevrolet when he had trouble climbing the steep, rocky roads that lead to his mountain lumber camps. Now Rego goes up in high gear with power to spare. He gets three times more tire mileage because they no longer spin on the rocks. In Vermont, the owner of a heavy house trailer installed a Jimmy engine in his car and put an end to the overheating troubles he used to have.

What kind of a power plant is the Jimmy, anyway? It's nothing more than a GMC truck engine. It fits with only a few changes into a Chevrolet's engine space. Reworked for high performance, it can deliver 175 horsepower plus and turns a docile Chevrolet into one of the fastest cars on the road.

Acceleration in high gear feels exactly

like the acceleration you get in second gear with a stock engine. And the Jimmy keeps winding up to 100 miles per hour without a flat spot.

At a drag strip recently, a Chevrolet with a Jimmy engine turned 94 miles per hour at the end of the quarter mile from a standing start, as against the 68 miles per hour it could do with a stock engine.

There's nothing new about putting bigger power plants in light cars, of course. A number of Fords have been repowered with Cadillac engines and these "Fordilacs" have surprising performance. And there's nothing new about the idea of reworking a stock engine so that it delivers more than its original horsepower. But most of this hopping-up has been confined to Ford and Mercury engines. Chevrolet owners had to take the dust of any reworked Ford until speed accessories designed especially for the Chevrolet and GMC engines became available.

Today, if you don't feel like switching to a Jimmy engine, you can rebuild a stock Chevy engine to develop far more than its original power. You can have a "conservative" road job, a "hot" road job, or a "full race" engine that burns alcohol and nitro and is suitable only for competition. The full-race engine is far too rough at low speed for use on the street. The amount of work that you do on the engine determines the kind of performance you get. The basic idea is to increase one engine's capacity to



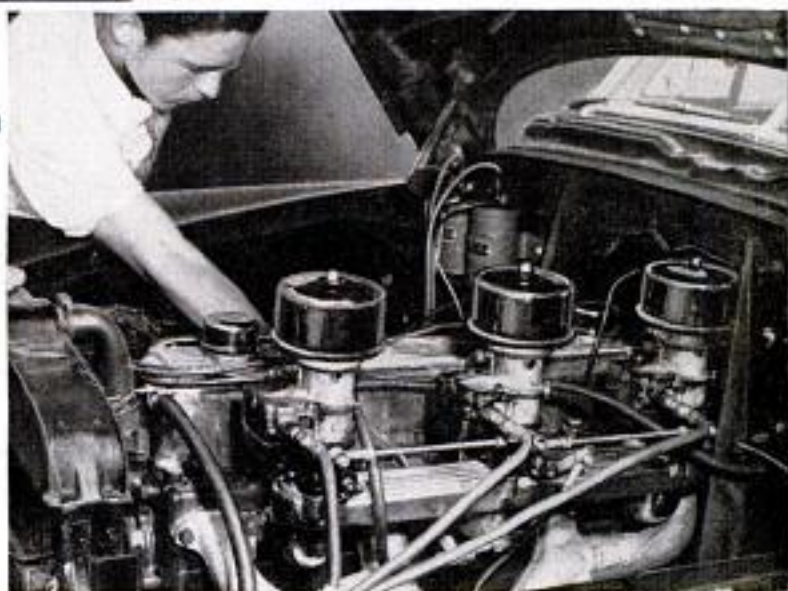
Horsepower

breathe more air and fuel. This is done in part by enlarging the cylinders, using larger valves and a special cam, and multiple carburetors.

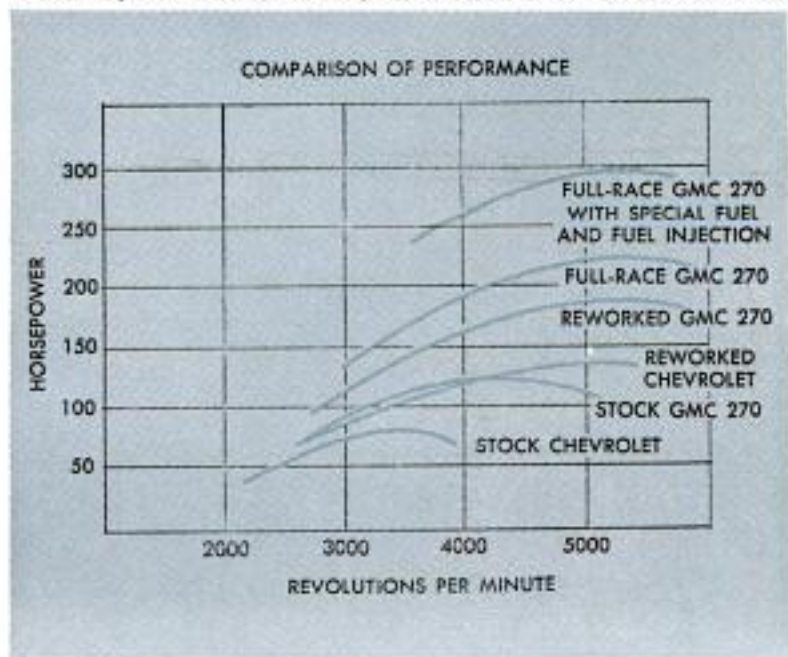
Recently a Chevrolet that had 15,000 miles on its speedometer was the subject of a before-and-after test. As it stood, it could accelerate from 0 to 60 miles per hour in 16.64 seconds. On the dynamometer its engine developed 64 horsepower. Then the engine was modified. Cylinders were bored to larger diameter, over-size valves and aluminum pistons were installed and a camshaft having faster lift was used. Dual carburetors with a special manifold were used as well as a dual exhaust system.

With these changes the engine produced 106 horsepower and the car now accelerated to 60 miles per hour in 11.03 seconds, some 5.6 seconds faster than before.

Reworking and installing a Jimmy engine is more complicated and yet some 2000 Chevrolet owners have done so with happy results. The GMC also fits the Pontiac and Kaiser after engine compartments are modified.



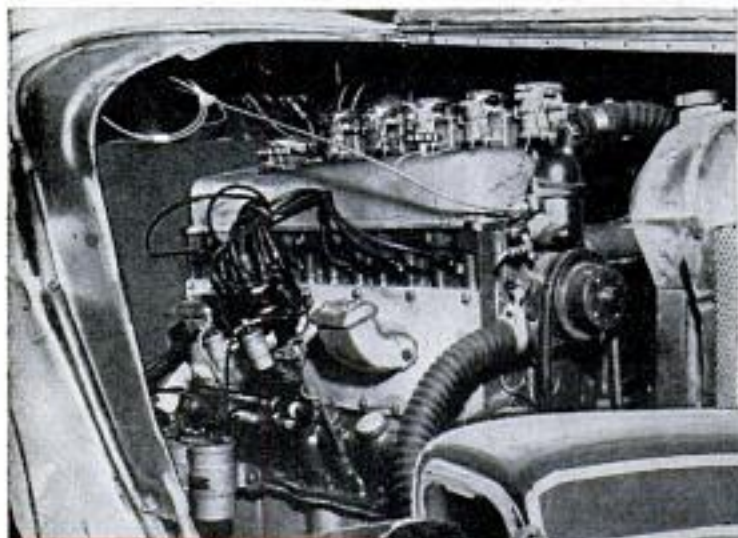
Customized Chevrolet (top) has reworked Jimmy engine (above) with three carburetors. Below, curves show horsepower of various engines. The Jimmy (GMC 270) develops 300 hp. with full-race conversion





McGurk Engineering diagram

Above, porting intake passages improves performance. Inset shows where grinding is done. Below, engine in competition coupe (bottom) has five carburetors. Car has hit 158 m.p.h.



Built for heavy duty, the 6-cylinder overhead-valve GMC line of truck engines have full-length water jackets, full-pressure oiling systems, heavy crankshafts and large bearings. The 270-cubic-inch size, by far the most popular, is rated at 105 to 120 horsepower depending on its year and yet, because of its sturdy construction, can be rebuilt to deliver close to 300 horsepower if the conversion is extreme. For ordinary street and highway use it is best to make changes that produce no more than 160 to 175 horsepower.

The Jimmy develops a lot of torque (having a 4-inch stroke) and so is ideal for hauling a house trailer even without being reworked. It weighs less than 100 pounds more than the passenger engine it replaces and has little effect on front-end handling characteristics of the car.

If you have more money than time you can have a reworked Jimmy installed in your Chevrolet for \$600 to \$800, depending on the amount of work that's done. Wayne Manufacturing Co. of Glendale, Calif., or McGurk Engineering Co. of Inglewood, Calif., will do the job or they will sell you any or all parts so you can do the work yourself. Each company has a booklet available that covers all conversion details. A full set of parts for reworking an engine comes to about \$225.

You can buy a good 270 "short"

block without accessories at a wrecking yard for \$35 to \$55. The first thing to do is have the cylinders bored out to $3\frac{15}{16}$ inches. This raises the displacement to 292 cubic inches and you now use the GMC 302 head gasket. If the engine is an old model with fiber camshaft gears, replace these with the aluminum gears now available. It's best, in fact, to use parts of the latest design while making any replacements. All bearings must be inspected and replaced if necessary and the crankshaft must be reground if worn.

Install special domed aluminum pistons that raise the compression ratio to 8.5:1. Install a $\frac{3}{4}$ -race camshaft. Replace the stock push rods with tubular push rods that don't flex or bend at high revolutions per minute. Valve seats are cut to take oversize valves and heavier valve springs are used. Intake ports are enlarged and smoothed by carefully grinding off the high areas of the walls with a stone attached to a flexible shaft.

Two carburetors for a conservative road job, more for more spectacular performance, and a special intake manifold to fit are required. You may use the stock Chevrolet ignition but for real efficiency you'll need two coils of high output plus a twin-point distributor. Costs start at about \$40.

The Chevrolet starter is hardly strong enough to spin a reworked Jimmy and the easiest thing is to replace it with a 1939-41 Cadillac starter that costs around \$10 secondhand. A LaSalle or a reworked Chrysler starter also works. Another solution is to use an extra battery and run 12 volts through the Chevy starter, wiring that voltage to the starter only.

Late-model Chevrolet flywheels don't fit the GMC and so a Chevrolet 1938-39 passenger or truck flywheel with a 4-bolt flange is used. A GMC 228 flywheel also

fits. Use a 10-inch Chevy truck clutch of the same years. For a full-race conversion, however, a heavy-duty Rockford pressure plate and disk costing about \$20 is recommended. The reworked Jimmy is too powerful for a Powerglide automatic transmission and should be used only with the standard manual transmission.

You need a larger exhaust system because of the greater volume of exhaust gases that are produced. A standard GMC system may be adequate for a conservative road job but better still is a system consisting of split exhaust headers and dual pipes. A pair of stock Chevrolet or Buick mufflers will keep the exhaust quiet.

It pays to change the ring and pinion gears of the rear end to use the greater power. A ratio of 3.73:1 or 3.55:1 is recommended. Either gives you higher road speeds at lower engine speeds.

There are no major difficulties in placing a Jimmy in any 1937 or later Chevrolet. Cars built since 1948, though, have a centered steering arm and to clear this the front end of the GMC oil pan must be cut away and reshaped with a welding torch. Use a 1938-39 Chevrolet water pump and a narrow fan belt that fits the stock Chevy generator.

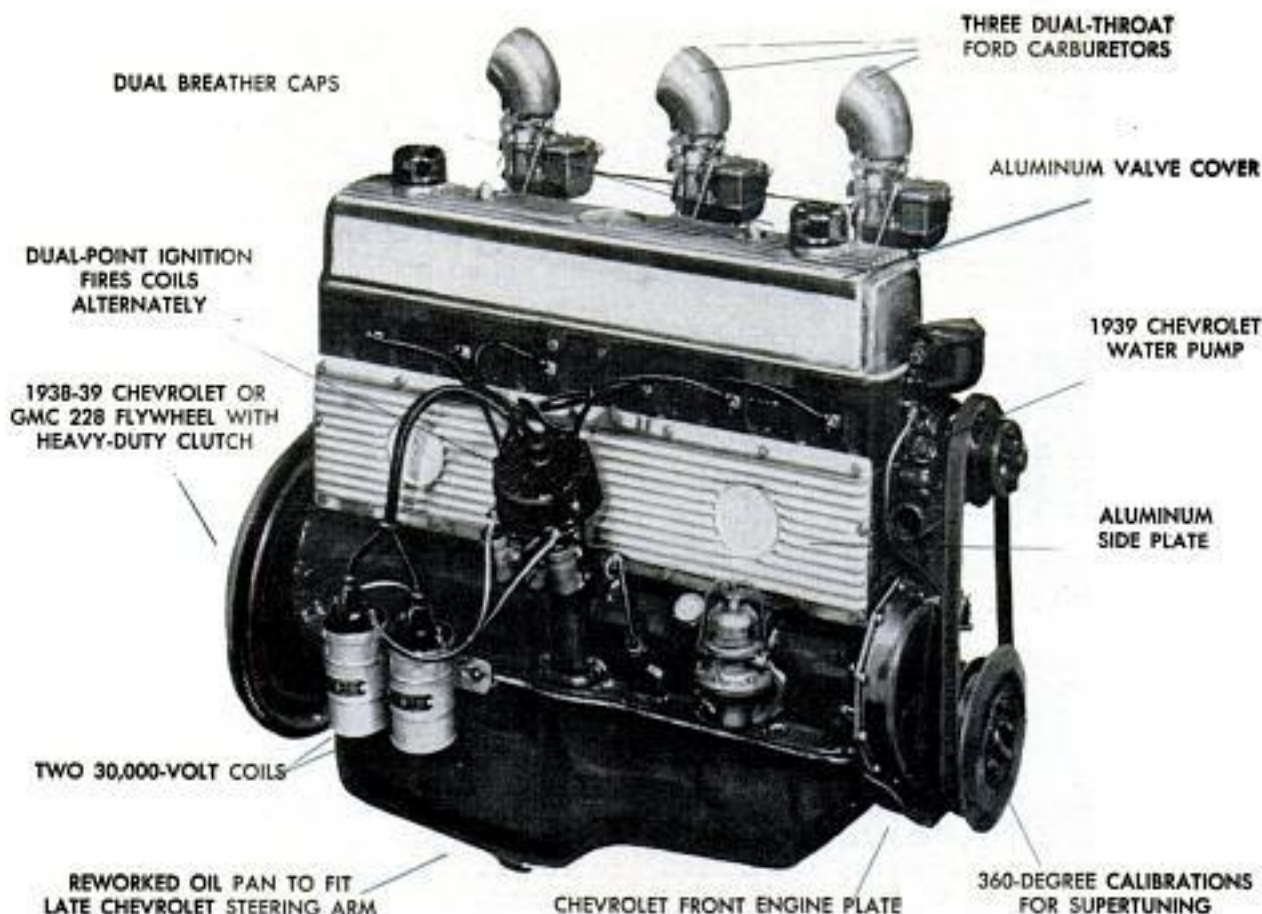
To install the engine the radiator must be moved ahead approximately an inch. Adapter plates that support the engine on the front motor mounts are available. The rear of the engine fits exactly onto the rear motor mounts and into the Chevrolet bell housing.

To move the radiator, cut off the cross-support bracket that carries the headlight wires and then unbolt the radiator from its U-channel support. Trim away an inch of the lower apron. With a hacksaw cut away some of the metal at the lower-front corners of the U-channel support. Now place the

Oil pan of the GMC engine has to be cut away and reshaped to clear steering linkage on the Chevrolet

Special ignition system costs extra, improves performance. This reworked unit develops about 175 hp.





Labels mark some of the changes made on a Jimmy engine for use in a street-driven Chevrolet (not for racing)

radiator in front of the U-channel support instead of in its original position and reattach it to the U-channel by means of longer bolts and spacers. The bolts screw into the nuts that are welded to the radiator flange. The cross-support bracket is now put back in place by welding new ends to it.

This conversion is going to cost you a little of the comfort you have with a stock car. Due to the longer stroke you'll be able to feel the power pulses at low speed, though this smooths out at about 25 miles per hour. The bigger engine is somewhat noisier, unavoidably. It takes more foot pressure to operate the heavier clutch. And, with all that power under the hood, sloppy shifting isn't recommended. You can tear out the clutch or transmission if you try to jam through the gears.

Not only is the Jimmy engine becoming popular for street use and modified stock race cars, it is an outstanding power plant for sports cars and for speed trials. One recent installation was a "full house" Jimmy in a new \$7000 sports car that is becoming a leading contender in West Coast sports-car races. The engine has three side-draft carburetors, a compression ratio of 9.5:1, and is mounted far enough aft in the chassis to put almost 60 percent of the car's weight on the rear wheels.

Last fall a modified coupe with a Jimmy engine turned 158 miles per hour at the Bonneville speed trials and the owner is now reworking the engine again. With peak performance he hopes to add another 20 miles per hour to its speed at the next Bonneville meet. ★ ★ ★

Lightweight Building Block Is Made of Clay

Made entirely of clay, a new lightweight building block has been developed by Armour Research Foundation of Illinois Institute of Technology. The blocks are of standard size (8 by 8 by 16 inches) and weigh 22 pounds, considerably less than cement-bonded blocks. The new ceramic block will not crumble or chip, but can be easily cut or trimmed and nails can be driven into it. In tests, the block has a com-

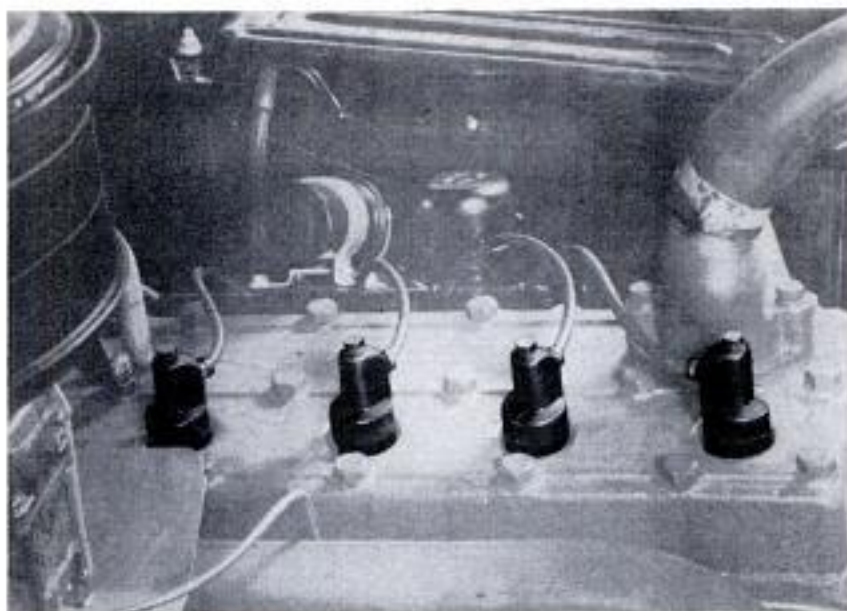
pressive strength of 1000 pounds per square inch. It has good insulation and acoustical properties and ceramic-block walls "breathe" instead of sweat. The block may be produced in a variety of colors from buff to dark maroon. Development of the blocks was sponsored by the Arabian American Oil Company. Although now made from Arabian clay, engineers believe they could be made from domestic clays.



Lightweight German Streamliner Has Engines at Front and Back

Germany's latest streamliner is a low, sleek, lightweight model with diesel engines at either end. Sixteen inches lower and a foot wider than standard German

trains, the train consists of seven jointed sections, 58-foot engine cars and 40-foot passenger cars joined over common axles. Made of aluminum, it weighs 88 tons.



Ceramic "Towels" Dry Spark Plugs

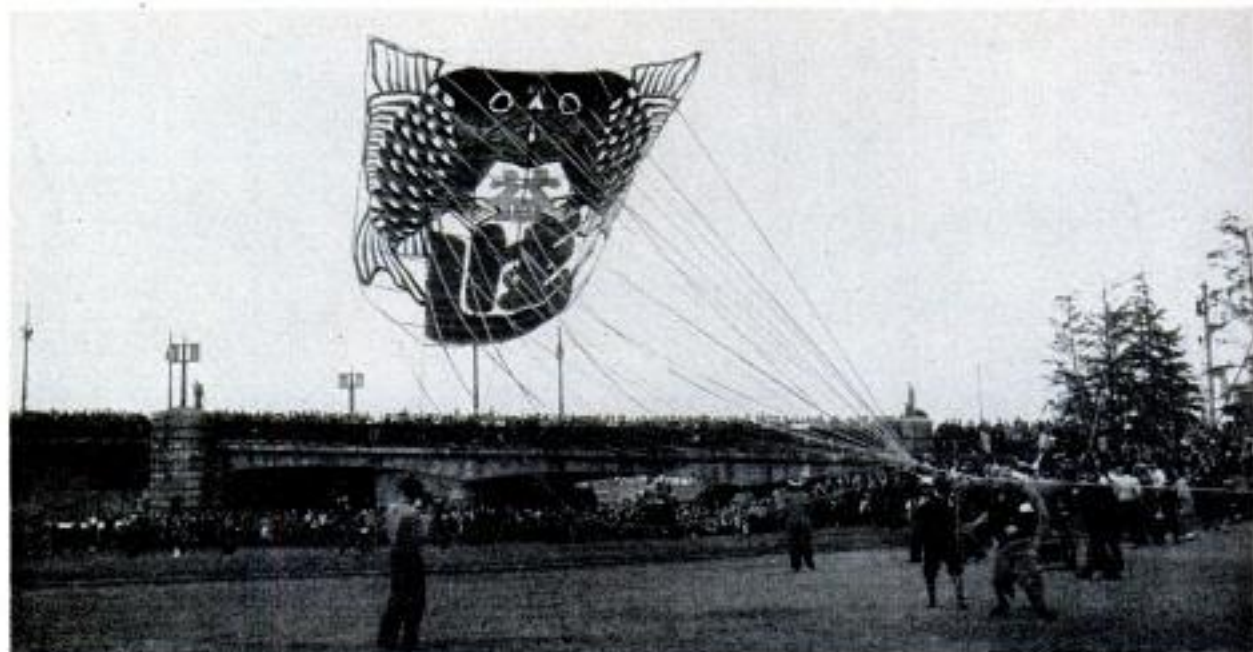
Gasoline engines will operate under the dampest conditions when spark plugs are protected by a rubber-covered ceramic cartridge. The cartridge absorbs any moisture which gets under the rubber cover. Engine heat dries out the cartridge, renewing its absorbent qualities. The covers are especially designed for use in coastal areas where fog and other airborne moisture frequently short ignition systems.

Double-Jointed Fork Truck Tested in Korea

There's very little a new Army fork truck cannot do in the material-handling line. Being tested at a Korean port, the truck has a maneuverable fork that can be lifted, tilted or pushed forward while carrying a load. It is designed to negotiate 24-inch-high obstacles without unbalancing its load. Low-pressure tires permit operation in rough terrain or sand.

During 1953 the domestic airlines of the United States carried nearly 1,500,000,000 letters.





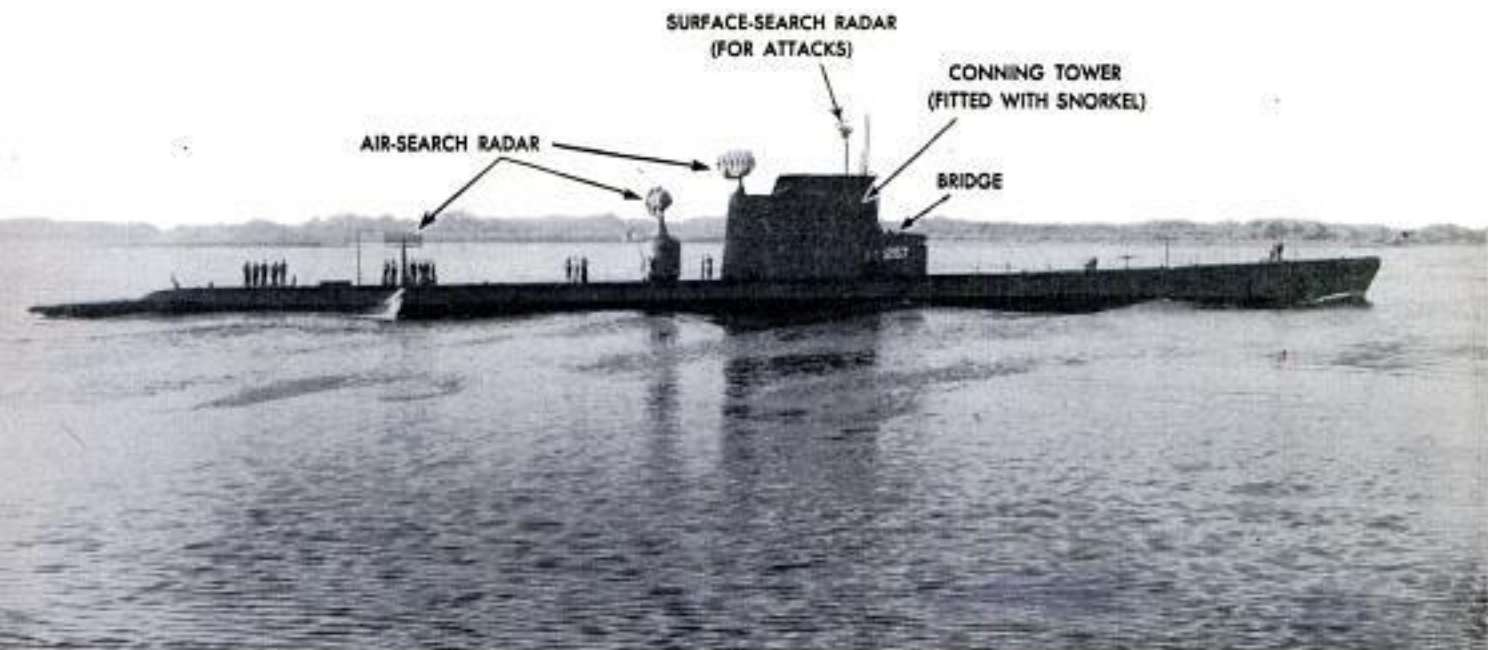
Gigantic Japanese Carp Kite Requires 200 Anchor Men

Two hundred men were needed to fly a giant kite launched in Tokyo. The kite, 36 by 39 feet, weighed 560 pounds and was painted to resemble the carp, Japanese

symbol of courage. It was used to celebrate the recent national Medium and Small Industrialists' Conference and carried the motto "promoting the public interest."

Midget Diesel Bike Engine Gets 300 Miles Per Gallon





Radar picket is completely equipped to detect enemy planes and subs. Snorkel permits long undersea cruises

The SUB THAT CAN LICK A PLANE

By **Captain John S. McCain, Jr.**
U. S. Navy

CHARLIE, WE NEED submarines as radar pickets. Kamikaze planes nearly finished off our destroyer forces," said the weather-beaten little aviator who wore the three stars of a vice admiral, U.S. Navy.

"John Sidney, we're way ahead of you. They are on the way," answered Vice Admiral Charles A. Lockwood, commander of our submarine forces in the Pacific during World War II.

John Sidney's last name was McCain [the author's father]. He had just fought Task Force 38, the fast carrier spearhead, through the nightmare of the closing days of our assault on the Japanese Empire. He had seen his screening destroyers mangled by the suicide-bent pilots for lack of early warning.

This conversation took place aboard the submarine tender USS *Proteus* in Tokyo Bay shortly after the Japanese surrender in September 1945. Today we've got these radar pickets—five of them!

They are the *Requin*, *Burfish*, *Tigrone*, *Ray* and *Redfin*—all, as usual, named after fish. They're deadly boats but the sting isn't in the torpedo. They do their damage



Author McCain, right, confers with Comdr. J. W. Reed, division commander for the radar picket submarines

secretly and quietly with radar. They finger out approaching planes that might attack the giant task forces by surprise.

They are loaded with a large assortment of radars made to detect high and low-flying planes. The many antennas and reflectors give a strange appearance to submarines once built to carry only torpedoes. When seen from dead ahead they look something like a catfish with all his feelers rigged for action.

With its own air-control center, the submarine can vector in our own planes to attack. At the same time it has its feelers out to detect suspicious contacts that may be the forerunner of an enemy raid. In

addition, it "delouses" returning strikes. This is air-defense lingo for an operation in which the radar picket searches in the direction of returning planes to make sure that they are not being followed. In case enemy planes attempt to trail our planes, it sends in fighters to knock them down.

These five submarines, distinguished warriors from World War II, now serve in a new role. The USS *Ray* sent 48,000 tons of Japanese shipping to the bottom. After the war she spent four years in mothballs in a state of suspended animation. Her decks were silent; no longer did the raucous blare of the diving alarm call all hands to battle stations. Then action of an entirely different sort beckoned and she was towed to the Philadelphia Navy Yard.

Under the deft knife of the naval constructor she was cut in two while in dry-dock and the halves were pulled apart. A 30-foot section was inserted and welded into place. Instead of a length of 312 feet, she has grown to 342 feet. She now displaces 2200 tons, 400 tons more than before the operation.

The surgery performed on the *Ray* saved \$9,000,000 as compared to the cost of building a new submarine—further proof of the

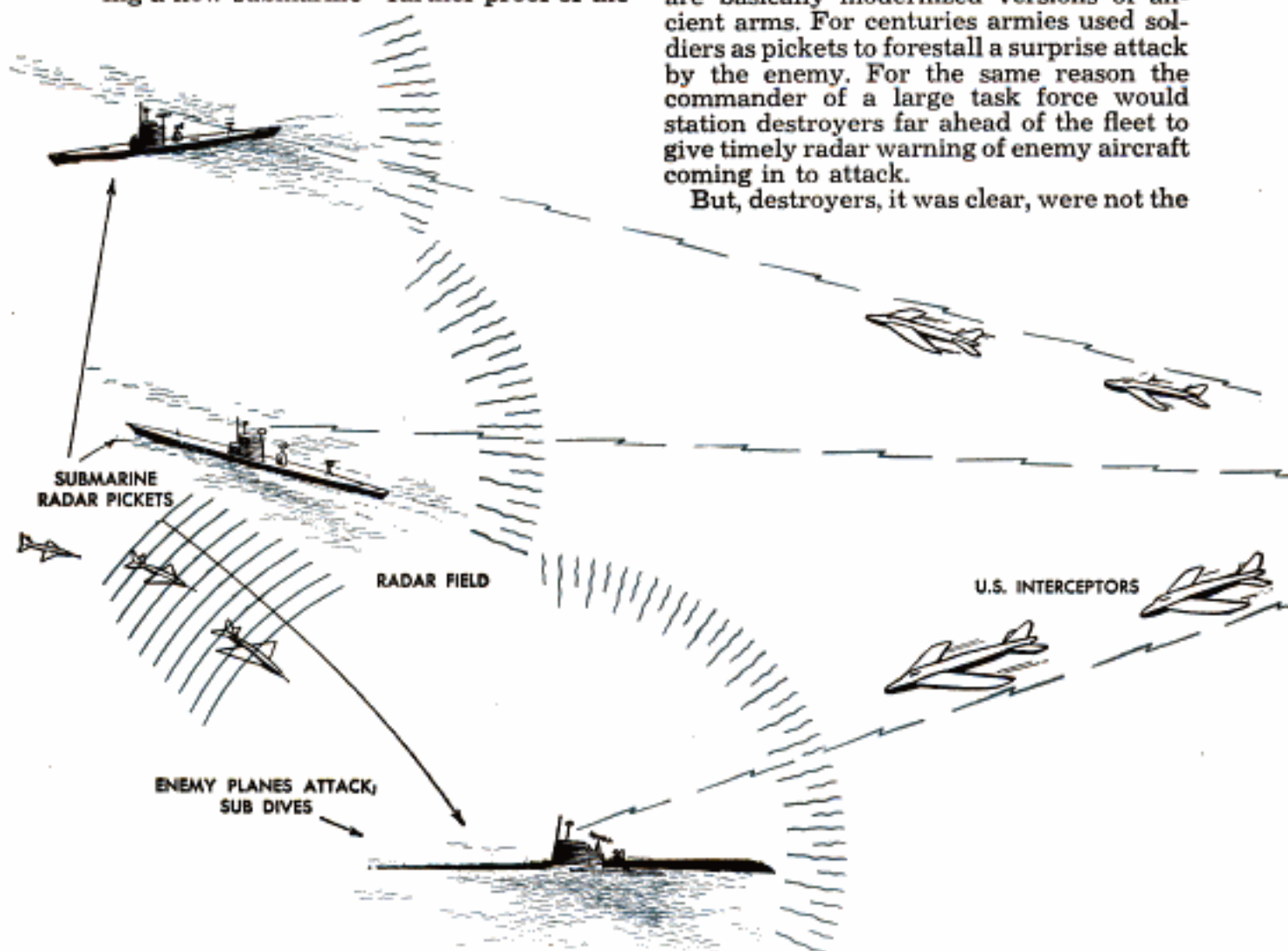
wisdom of putting our ships in mothballs.

The new section contains the "air-control center" which does just what its name implies, controls the planes. Here information is received and evaluated for use in the direction of our own fighter planes. To do this requires radar repeaters, status boards, dead-reckoning tracers, remote-radio equipment and internal-communication systems. Air-search radar, height-finding radar and aircraft homing gear complete the picture. When all this equipment is in operation, the heat generated becomes a problem. Air conditioning is a must. Two 17-ton units run continuously.

The care and maintenance of the mass of tubes and electrical circuits requires high technical skill. The crew includes fifteen radiomen, radarmen and electronics technicians, not to mention the score of strikers under training. These men must be of the highest caliber because once the sub is at sea it is entirely self-sufficient. The conventional submarine has a crew of 70 men; this sub needs 85 men to accomplish its missions.

The Navy's thinking behind radar pickets is not very new or radical. Most weapons are basically modernized versions of ancient arms. For centuries armies used soldiers as pickets to forestall a surprise attack by the enemy. For the same reason the commander of a large task force would station destroyers far ahead of the fleet to give timely radar warning of enemy aircraft coming in to attack.

But, destroyers, it was clear, were not the



best vehicles for picketing in World War II. While serving as radar pickets during the closing days of the war our destroyers suffered terrific losses. In all, 134 of these ships were sunk or damaged with the loss of American bluejackets running into the thousands. Most of them were hit by Kamikaze planes off Okinawa. In this campaign 9,731 officers and men from all the ships of our Navy lost their lives. More, by far, lost their lives to suicide attacks than to any other cause. In fact, it got so bad that one destroyer in an effort to divert the Nip hung a large sign over the side. It consisted of a large arrow pointing aft and underneath in big letters were the words, "This way to the carriers."

On the 14th of April, 1943, the destroyer USS *Laffey* moved into Radar Picket Station 1, north of Okinawa. This put her in a position to detect Jap planes coming in from the Empire. The landings were in full swing and the Nip was fighting for his life. The 15th passed with a large number of contacts but nothing out of the ordinary. The 16th of April was a different story. In the space of 79 minutes the *Laffey* took a total of 22 Kamikaze attacks. Against those, she shot down nine planes. Seven hit the ship and five did extensive damage; the other knocked off a radar mast and one of the yardarms. Three officers and 30 men were killed.

The reason we picked submarines for the

Submarines in constant radio contact with carrier and escorts many miles away can detect enemy planes in time to warn task force, direct U.S. interceptors, then dive to a depth where they're immune from attack



CARRIER TASK FORCE
APPROACHING
ENEMY SHORES

MARCH 1954



Radio operators on radar-picket submarine monitor ship-plane-sub messages coordinating the attack



Evaluator in radar-picket sub directs U.S. planes to intercept enemy aircraft. Below, plotters spot positions of friendly and enemy planes on glass charts. Man at left is marking "TH" (target height)



job is simple. They're low in the water; they're hard to detect and can dive within seconds to a depth where they are relatively immune from prolonged aerial attack. Perhaps the best reason for the picket sub's existence is that it can detect the oncoming planes, send out a warning to the fast carriers hundreds of miles away and then submerge. The attacker is robbed of the element of surprise, nine-tenths of the battle, and can be met with force.

Radar pickets can be sent out days or weeks ahead of the time when a fast carrier force would move into an area for attacks. The attacks, unleashing tons of bombs, might be intended to weaken the enemy's position and destroy his war potential or they might be the preliminary to a gigantic invasion.

The picket skipper gets his sailing orders, is briefed by the admiral, boards his submarine and departs. Once clear of the channel and buttoned up for operation, he calls his officers to the wardroom for a conference on the coming mission. Up to this point they have been kept in the dark. The entire success of the strike depends upon secrecy.

With charts spread over the tiny wardroom table, the course to the point off the enemy coast is carefully checked and discussed from all angles, not the least of which is the possibility of detection by the enemy. Discovery of the submarine might

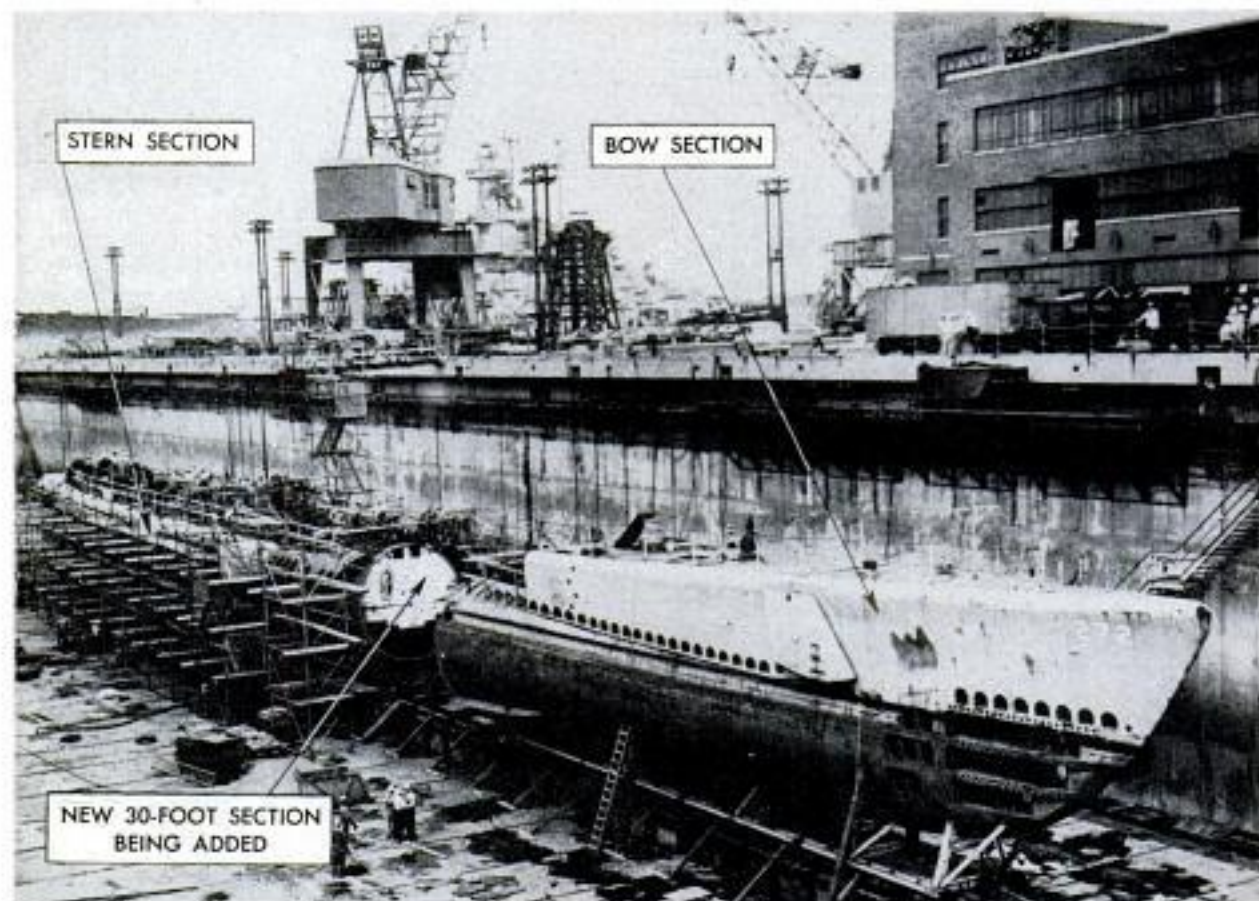
well ruin the entire effort in a dead giveaway. It's a cinch that the enemy will use his coastal fishing boats as lookouts. He will certainly have patrol planes out and there will always be the danger of discovery by his submarines. All these things must be considered and weighed. The depth of water as the sub gets closer to shore is another important item. A submarine in shallow water is no better off than a fish under the same circumstances. When is the moon going to be full? A full moon makes it dangerous for a submarine to surface at night. Although "D Day" will come at a time during the month when there is no moon, the sub arrives on station long before this.

Operation orders tell the skipper he must make 240 miles every 24 hours. This gives him a chance to proceed at snorkel depth, which lessens the chances of discovery by enemy antisubmarine forces. Also, he can drill at diving and other exercises and still have sufficient speed to regain position.

As the sub nears the coast, stealth and secrecy are paramount. The skipper spends all his waking hours on the bridge when on the surface, and in the control room when submerged. He sleeps on a catch-as-catch-can basis, always with "one eye open." The captain of a submarine is in a position somewhat different from that of commanding officers of other ships. He is

(Continued to page 228)

USS Ray was sliced in half and 30-foot center section added to convert it to picket sub. New length is 342 feet



Machine "Plays Records" To Sew Desired Stitches

Imported from Switzerland, a new portable sewing machine "plays" plastic disks to produce almost any desired variety of stitch. The disks, slightly larger than a half dollar, are inserted into the top of the machine, and without further attachments the machine produces the recorded stitch. The machine sews straight and zigzag stitches; it sews on buttons and knitted fabric; it makes button-holes, blind stitches, monograms and scores of ornamental stitches. The number of designs is limited only by the number of disks, and more than 100 disks are now available with others planned for the future. The carrying case of the machine opens out into a full-size worktable. It includes an accessory box in which the home sewer can store a supply of thread, needles and other accessories. A "free arm" on the machine enables the seamstress to sew or mend socks, sleeves, trousers and anything else of a tubular nature. A twin needle clamp permits her to use two needles with different threads at the same time. A calibrated control adjusts the bobbin tension to the thickness of the fabric. The machine has a built-in knee control. Also available is a lower-priced model of the machine which does not have the plastic-disk mechanism, but is so designed that this feature can be added at any time in the future.

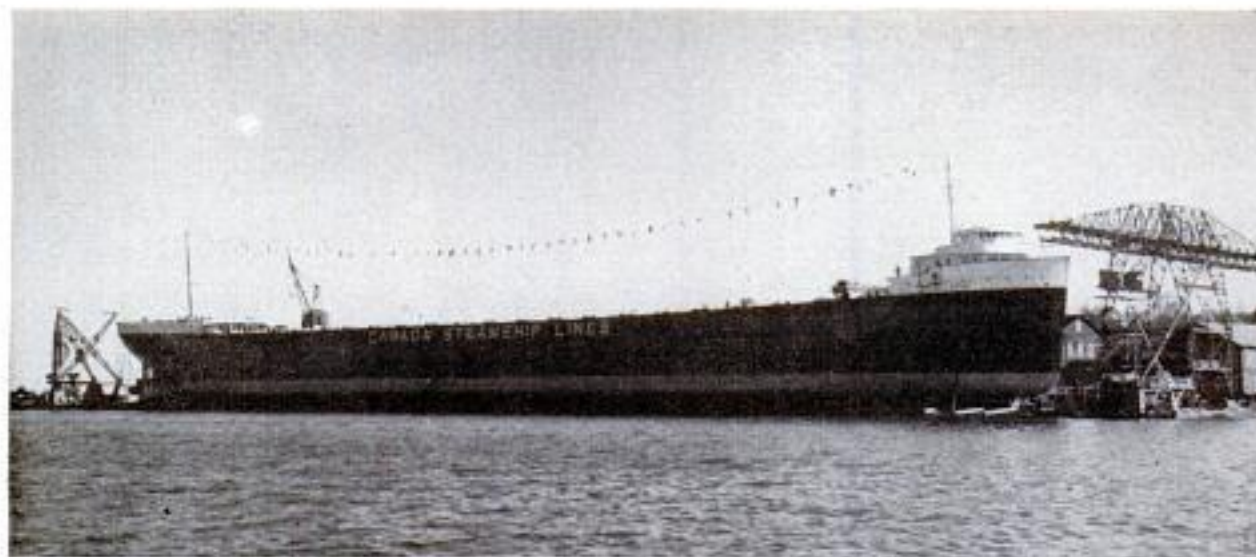


Dye Sprayed From Pressure Can Finds Flaws in Metal



Dye sprayed from a pressure-type can is drawn into cracks or pores to show up flaws in metal. A kit containing the dye and other chemicals is used to detect faults in weldings, castings, tools and machined parts. The dye is sprayed on the surface to be tested. This is followed by a spray-on cleaner, which is removed by wiping. An even coat of white developer then is brushed on and the spot is inspected. Cracks show up as bright red lines and pores or leaks are indicated by red spots.

If you do not find the information you need in the WHERE-TO-BUY-IT INDEX, starting on page 12, sources of further information are available without charge from Bureau of Information, *Popular Mechanics Magazine*, 200 E. Ontario St., Chicago 11



Biggest Great Lakes Freighter Completed in Record Time

Only 41 weeks passed between keel-laying and launching of the 715-foot *T. R. McLagan*, said to be the world's largest inland-lake freighter. If the Canadian vessel had been any longer, it could not have traversed

the locks between lakes. The \$6,000,000 ship burns fuel oil and is powered by a steam turbine supplied from two water-tube boilers. It will exhaust through a single stack 80 feet high and 65 feet around.

Self-Loading Truck Picks Up Huge Logs

Speedy salvage of beetle-infested timber in Oregon forests is the function of a self-loading logging truck. A typical model built by logger-mechanic Roy Menteer starts with a 105-horsepower truck. Menteer rebuilds the frame, lengthening it to 26½ feet and reinforcing it for ponderous loads. A chain-drive rear end is installed. Behind

the cab are mounted a 10-foot steel A-frame and a 15-ton winch. A power take-off on the transmission case drives the loading line. Built into the boom is a manually operated hydraulic jack for use when extra clearance is needed. Two men handle the rig; the only other logging equipment needed is a pickup truck and a power saw.





Playing "radio bingo" in Denver VA hospital. Headset outlet on wall has a pull cord for program changes

More than 125,000 veterans have a direct pipe line to sports, music, fun and education on Uncle Sam's

Bedside Radio Network

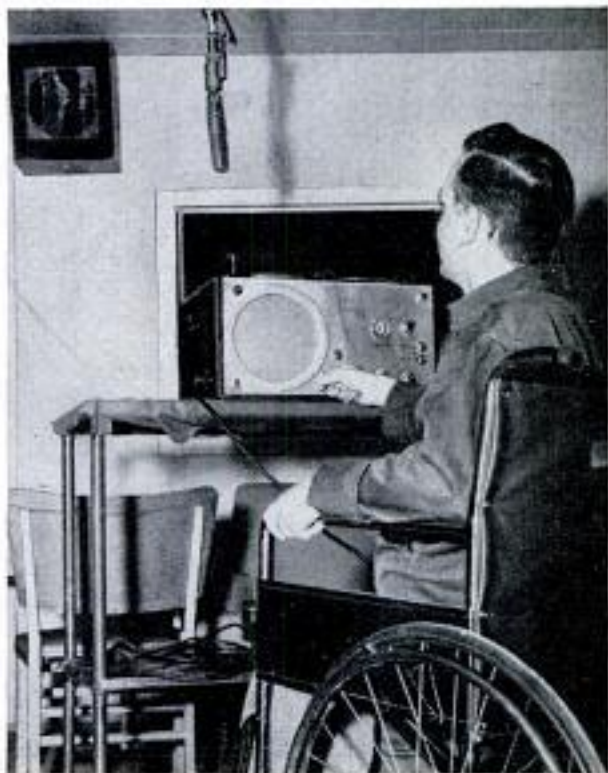
By William Harnin

Patient-announcer beams a "taped show" to buddies

MORE THAN 125,000 listeners a day—every one a hospitalized ex-GI! That's the exclusive clientele of the Bedside Radio Network, comprising 165 stations at Veterans Administration hospitals in every state and Puerto Rico. These broadcasting units are pioneering a new teamwork concept in the hospital field: therapy by radio.

The Bedside Network broadcasts exclusively within each hospital area to Uncle Sam's sick and wounded veterans. With the exception of VA recreation personnel assigned to supervise the stations, the unique sickroom radio chain is staffed almost wholly by patients.

In the main control room of each hospital are FM and AM receivers tuned to outside radio programs. The programs are amplified and channeled directly to the wards. Patients have their choice of three to five different shows. Volume control, tone control and outside station selections are adjusted at the master console in the hospital studio. All VA radio stations boast modern equipment, most of which experiences





Monitoring a newscast originating at the hospital, Gene Boone of KDVA has grade-A equipment to work with

Portable units, like this remote-transmitter cart with a player for 16½-inch records, make the bedside broadcasts possible. Sports and music rate high as entertainment fare with most convalescents



very hard use in maintaining a 14-to-16 hour daily broadcast schedule.

The network depends extensively upon Armed Forces Radio Service 16½-inch transcriptions supplied to hospitals by the Armed Forces Information and Education Division. These records provide the variety of musical shows, stage entertainments, and dramas so familiar to World War II and Korean veterans. Additional use is made of standard 78, 45 and 33½ r.p.m. recordings.

Upkeep of the complex wiring, audio-system amplifiers and control console falls upon each VA hospital's engineering officer. Routine monthly inspections and repairs of all bedside headsets, selector switches, ward loudspeakers and amplifiers in the main control room are conducted by electrical experts.

Although no station in the VA network may broadcast outside the hospital area (the units operate independently and cannot be linked for a nationwide simultaneous broad-



Listening devices can be provided to meet any patient's particular need. Bed patient wears conventional headset and man in center holds a plastic pillow speaker. Stethoscope headset, right, has special volume control

cast) each station prides itself on its call letters. At Fort Wayne, Ind., WFWI does an outstanding job in providing radio entertainment. At Castle Point, N. Y., it's WRBS; at Lyons, N. J., KOLH and, at Cheyenne, Wyo., Station KCVA. Organization of the Veterans Administration's vast chain of Special Services radio outlets began early in 1946.

Radio is important in Veterans Administration hospitals because it is a major link between the isolated patient and the outside world. That's why it is necessary to analyze all programs, selecting only those which satisfy the special requirements of the men. This difficult assignment is handled by hospital recreation, a part of the special-services division.

Usually, convalescent veterans will not listen to soap operas, commercials or "agony" dramas. Instead they demand—and get—sportscasts, good music, news and special medical shows which tell them about their particular medical problems.

Patients interested in announcing, script writing and bedside disk-jockey chores are trained and given assignments. Prior medical clearance by physicians, however, is mandatory. Consideration must be given to the physical limitations of each patient.

Numerous unusual programs have been developed. At Cheyenne, bedridden paralytics play checkers on numbered checker-

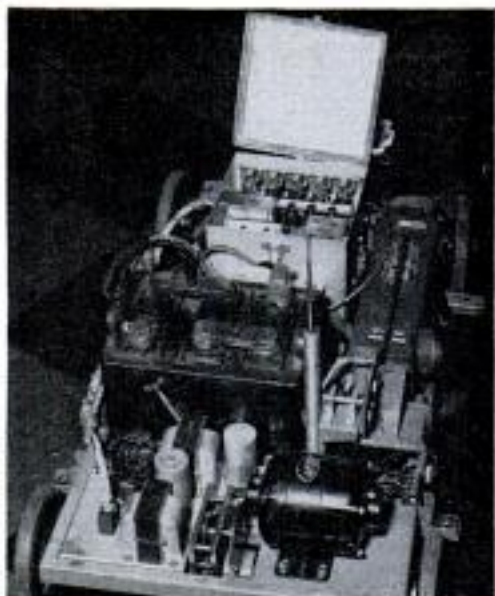
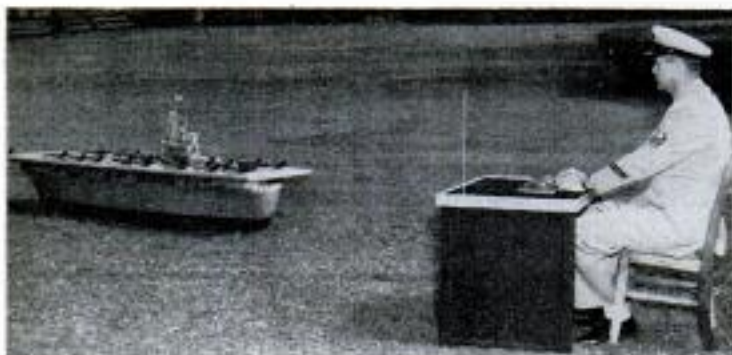
boards. The men use hospital "mikes" at the bedside to indicate their moves. In some hospitals the vets play "radio bingo."

At Castle Point, N. Y., a group of patients called "The Strivers" presents 48 live radio programs weekly. The Mask and Wig Club of Marion, Ind., performs a similar function, while Walla Walla, Wash., veterans forget their own discomfort by transcribing disks for students at the Vancouver School for the Blind.

Wardcasts, programs which emanate directly from bedsides, are popular with all VA patients. In reality, the wardcast is a remote-type broadcast channelized through the central multichannel set-up. Such programs include radio bingo and disk-jockey shows.

Patients record some "taped" shows exclusively for bedside listening. Subsequently, the tapes are circulated to other VA hospitals throughout the country. Featured performers, including Stan Kenton, Jimmie Durante and Burl Ives, have taped 15-minute and half-hour entertainments in many VA radio rooms.

The "Tape Recorder Network" of 80 member hospitals—a network within a network—is divided into eight separate operating divisions. Thus hospitals on each circuit (the tapes are shipped by mail) can share their best taped shows with each other. Naturally, the patient benefits! ★★ ★



Model Navy Panther jets ride the plywood flight deck, upper left, of the rubber-tired carrier. Speaker is hidden under airplane elevator in bow of carrier's flight deck

With hull and deck removed, above, carrier chassis is a compact maze of batteries, motors, receiving equipment and the drive mechanism. The motor is in the foreground

Operating carrier model, left, is a simple matter of moving two double-acting toggle switches for desired direction. A third switch cuts in the communications system

Carrier Model Rides Landlocked Course on Scooter Wheels

Riding on rubber-tired scooter wheels instead of waves, a *Midway* class carrier model operates in a half-mile-wide "sea" at the Naval Gun Factory, Washington, D. C. Christened the USS *BuShips*, the crewless, landlocked craft was made from scrapped plywood and junked electronic equipment. It is 9½ feet long and weighs 122 pounds. An FM transmitter, operating on ordinary house current, gives the oper-

ator full control of the ship's movements within a half-mile range. The carrier's driving power comes from an automobile battery that can propel it at top speed of five knots. One battery charge runs it for four hours. A small electric motor that once raised and lowered the convertible top of a wrecked Mercury now steers the craft's nose wheel, which was formerly part of a hospital bed.

Pipe Clamp Tightens to Form Seal Around Leaks and Connections



Leaks in water, oil and steam pipes are stopped with a two-piece fitting that clamps around the pipe. Four screws are tightened to contract a Neoprene gasket and form a gastight, watertight seal on each side of the leak. The clamp can also be used to assemble temporary or emergency lines without threading the pipe units. Two models are manufactured: A bell type to repair leaks at joints, and a cylindrical type for leaks in the pipe itself.

Information not listed on articles in the index frequently is listed in the WHERE-TO-FIND-IT LIST, free to readers from the Bureau of Information, *Popular Mechanics*, 200 East Ontario St., Chicago 11

NACA has experimented with designs like this wing-tip ramjet with horizontal control surfaces in the nose of ship



THE SHAPE OF TOMORROW'S PLANES

By Thomas E. Stimson, Jr.

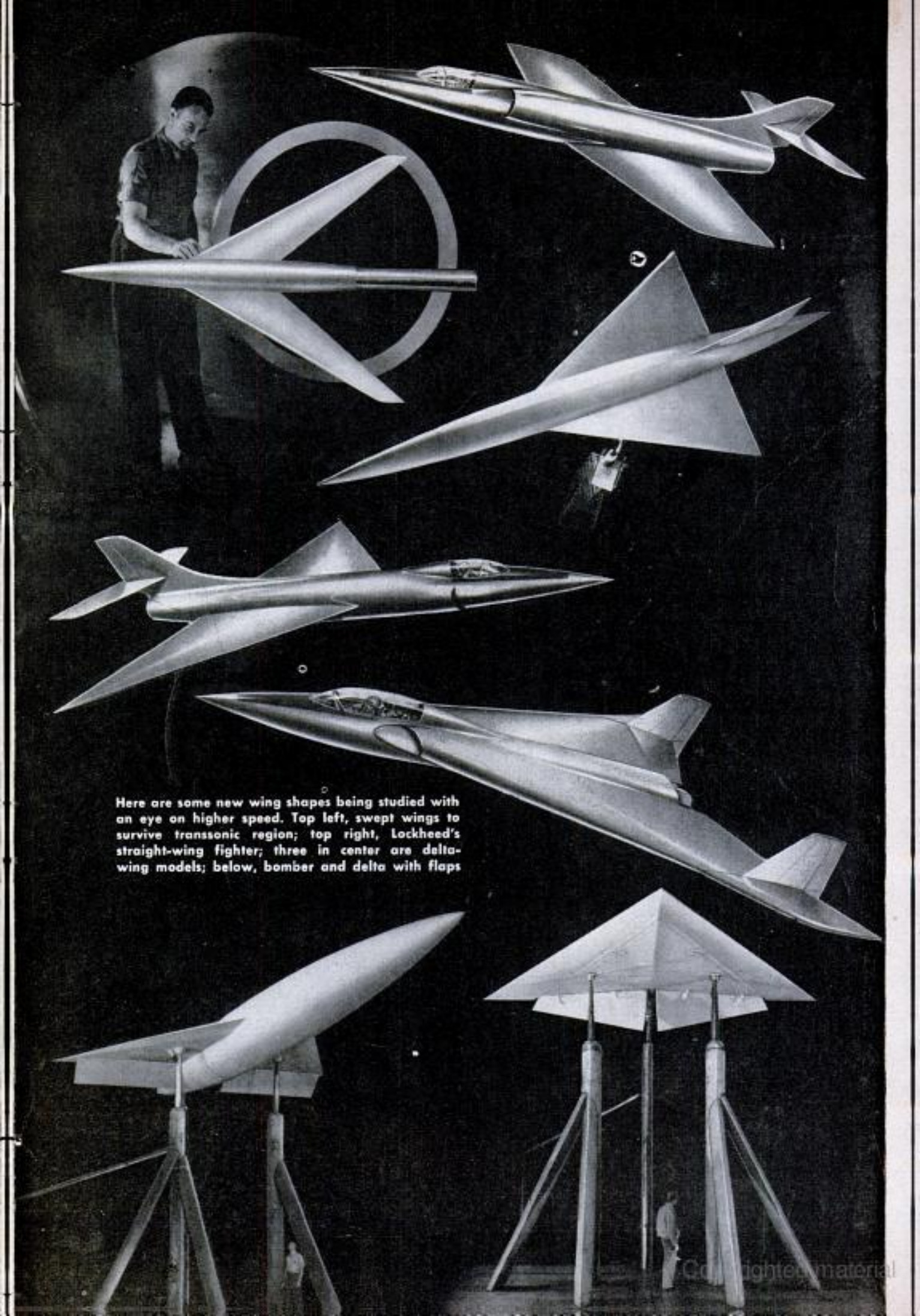
BEHIND THE CLOSED DOORS of America's aircraft factories a battle of wits and wind tunnels is under way to decide the shape of tomorrow's high-speed airplanes.

"A thin, straight wing is okay," one engineer muses, "but where will we stow the fuel and landing gear? Can't pull a trailer behind the plane. We'll use a delta wing that has lots of room inside."

Grouped around the needle-nosed Douglas X-3 research aircraft, are types including straight wing, delta and swept-back wing model



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Here are some new wing shapes being studied with an eye on higher speed. Top left, swept wings to survive transsonic region; top right, Lockheed's straight-wing fighter; three in center are delta-wing models; below, bomber and delta with flaps

"Trouble with the delta is its high landing speed," another decides. "We'd need to increase the size of the wing to get the landing speed down, and that increases the drag. A swept-back wing looks better."

And a third engineer, weighing the merits of all the shapes, concludes that a straight wing can't be beaten after all.

The result is that aircraft are taking on a variety of planforms never seen before. The Germans pioneered the swept-back wing design during the last war and made studies of the delta shape as well, but little else was done until about six years ago when North American tested its swept-wing F-86 and Boeing wheeled out its swept-wing B-47 bomber. At about the same time Consolidated Vultee was completing its XF-92A, a research plane with a triangular delta wing. This wing proved so successful that Convair has since flown two other high-speed delta aircraft, the F-102 and the XF2Y-1 Sea-Dart which is a water-based plane.

Official records don't yet suggest that any one shape is outstanding. In 1948, a swept-wing plane took the world speed record away from a straight-wing type, then last year one American and two British swept-wings each set new speed records in a row. Weeks later the Douglas F4D Skyray, a modified delta, captured the record at 753 miles per hour. Shortly afterward, a new North American swept-wing Super Sabre, our first supersonic combat plane, flew in excess of 754 miles per hour.

The competition hasn't ended and there's every chance that the delta F-102 will fly fastest of all when tested, possibly this year. And it might be that Lockheed's new straight-wing F-104 "air superiority" fighter will return the speed record to that type when it flies.

The 1327-miles-per-hour speed of the Skyrocket and the more than 1600-miles-per-hour speed of the

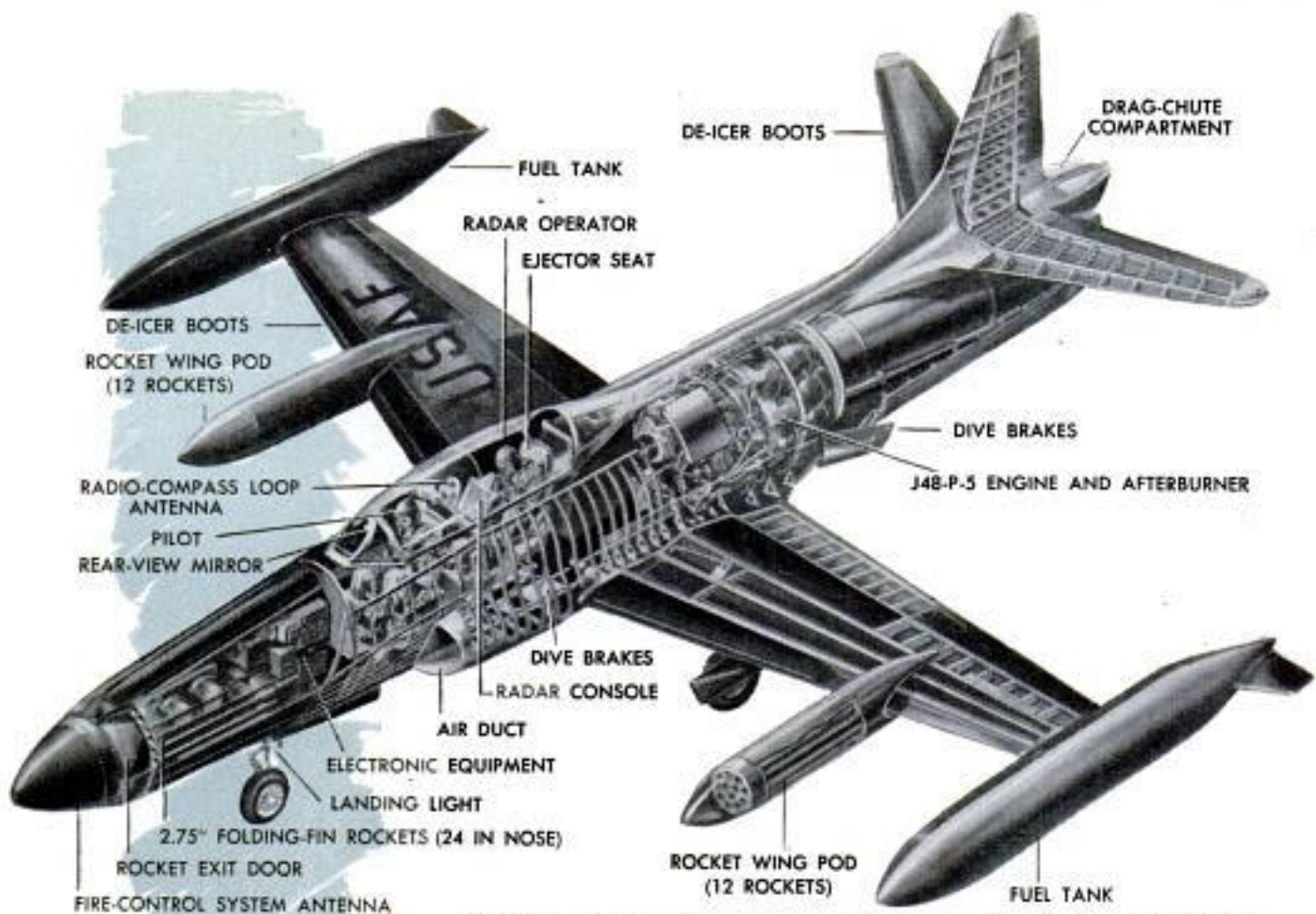


First U.S. delta-wing aircraft was a Convair XF-92A



Above, a Convair Sea-Dart, first delta wing water-based fighter, uses hydro skis. Below, Douglas XF4D-1 Skyray held short-lived record of 753 miles per hour





Cutaway above is of the Lockheed Starfire, a 600-miles-per-hour aircraft

from the end of the new runway. The combination of the two dry lake beds and the connecting clearway will provide 22 miles of straight-line landing area.

The control tower at Edwards is 140 feet tall. Men with field glasses and radio mikes can direct traffic on a runway that is a mile away. When the occasion demands, they can control take-offs and landings five or six miles away on Rogers Dry Lake.

In addition to flight testing both fast and heavy planes, Edwards is the home of the Air Force Experimental Test Pilots School.

Below, models of various straight, tapered, swept and delta-wing shapes tested recently at supersonic speeds in wind tunnels at research labs



LOCKHEED STARFIRE



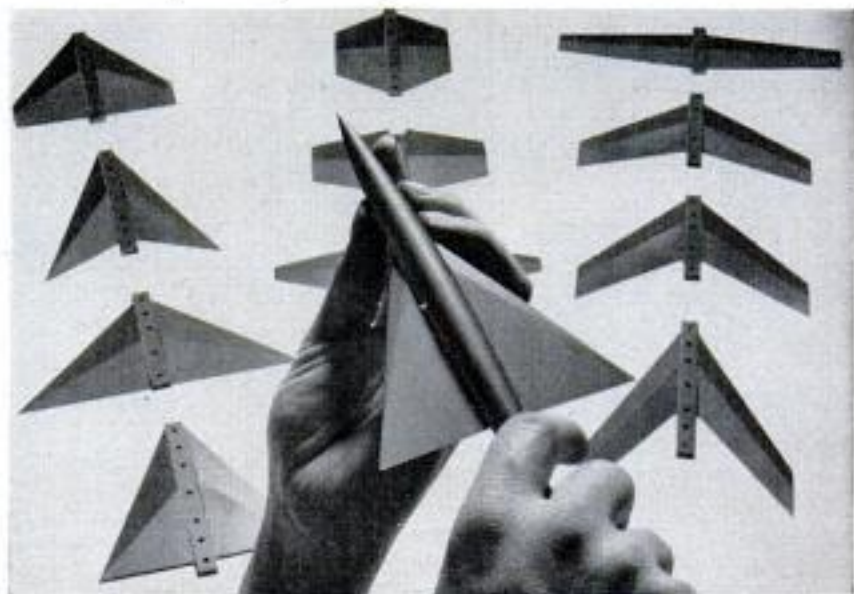
DOUGLAS SKYROCKET



DOUGLAS SKYRAY



CONVAIR SEA-DART



In the field of large aircraft, a search is also going on for the fastest and most efficient wing shape. Boeing and Douglas both have done research on jet passenger liners designed to travel at 550 miles per hour, and each design has a swept wing. But in England the Avro Vulcan bomber in the same speed range has a delta wing. It is literally a flying triangle with fuselage attached. Avro plans a big transoceanic passenger liner with the same wing shape.

The fact is, says the National Advisory Committee for Aeronautics, that many other things beside top speed alone help to determine the planform of any particular aircraft. The desired cruising speed, desired range, structural weight, available power and permissible landing speed, plus the way that the engineers decide to build these characteristics into one package, all help determine the final shape. Power is always more important than wing shape alone for high speed.

In its wind tunnels near San Francisco the NACA has tested nearly every conceivable shape that an airfoil might take. For one "mission" alone the research staff made wind tunnel runs on 20 different wing shapes ranging from straight to swept to delta, then turned their findings over to the manufacturer for final choice. NACA makes no recommendations, it merely reports its findings.

Briefly, comparisons of the different wing shapes are summed up this way:

Strength. Delta is structurally the soundest and permits the design of a thin wing weighing less than the other shapes.

Take Off and Landing. Here the straight wing excels because it requires the shortest runs. Swept-wings and particularly deltas develop their lift at high angles of attack and they take off and land in a "flared" nose-high attitude. Pilot's cockpit must be moved farther forward in the nose to insure good visibility in this position.

Maneuverability and Stability. Stability of the delta doesn't change much in its entire speed range, as does a straight-wing, yet it tends to yaw and pitch and requires damping controls. Swept-wings with tails probably maneuver more easily.

High Speed. Swept-back and delta wings delay the compressibility effect and go through sound without the enormous increase in drag that occurs to a straight wing. Swept and deltas may be best at Mach 1, the speed of sound, though

Ramjet engines mounted on the wing tips of a Lockheed F-80 Shooting Star spurt flames on test flight. The tubes are 20 inches in diameter



MARCH 1954



CONVAIR F-102



CONVAIR F-92A



NORTH AMERICAN F-100



NORTH AMERICAN F-86



BOEING B-52



DOUGLAS X-3



DOUGLAS SKYSTREAK



NORTHROP X-4



Boeing B-47 Stratojet with JATO equipment sears the earth at Edwards Air Force Base, Calif., in take-off



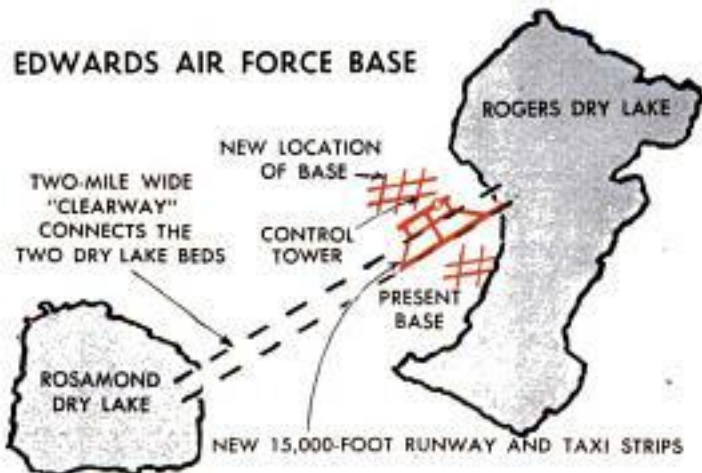
a tapered straight wing may prove best at Mach 2. However, the delta has become a conventional shape for the control surfaces of missiles that fly much faster than Mach 1.

The general conclusion is that the delta has a slight edge over the swept wing and a bigger edge over the straight wing for achieving supersonic speed with a given power plant. Actually the merits of each planform will be decided only by flight testing and that is the stage that is occurring now.

Aircraft engineers expect that it will be a number of years yet before planes are flying at supersonic speeds, except for a few research craft. It's true that several fighter planes can travel faster than the speed of sound, especially in dives, but these short bursts of speed are beyond the normal operating speeds of the aircraft. Today's fastest production aircraft are considered to be of the transsonic instead of supersonic type. The region of supersonic speed begins at 800 or 850 miles per hour.

Looking into the future, the engineers agree that it is going to take much more than an advanced wing and a big power plant to achieve supersonic speeds. The big problem is to prevent the aircraft from literally burning up while flying fast. Better wings, better engines and some way of rolling back the thermal barrier

(Continued to page 248)



The 140-foot control tower at left is midway of main runway at Edwards which connects two dry-lake beds to provide 22 miles of straight-line landing area at this 200,000-acre Air Force flight-test center. Rosamond Dry Lake is an emergency landing area for pilots

Heartbeats and Brain Waves Telephoned to Distant Specialists

Rural doctors can soon obtain the diagnostic services of heart and brain specialists located 3000 miles away. The patient's electrocardiograph signals or brain waves are amplified, changed from AM energy to FM tones and then transmitted over telephone lines to a specialist in a distant city. Receiving equipment enables him to analyze the patient's heart condition or brain waves immediately, or to store the data on magnetic tape. In the case of a heart patient, the specialist receives an electrocardiogram. Brain waves, which may indicate cerebral hemorrhages or brain tumors, can be heard, traced on paper and made visible on a cathode-ray tube. The method and equipment were developed at the University of Nebraska.

Amplified brain waves of patient, right, are converted to an FM signal and sent by long-distance telephone to consultant

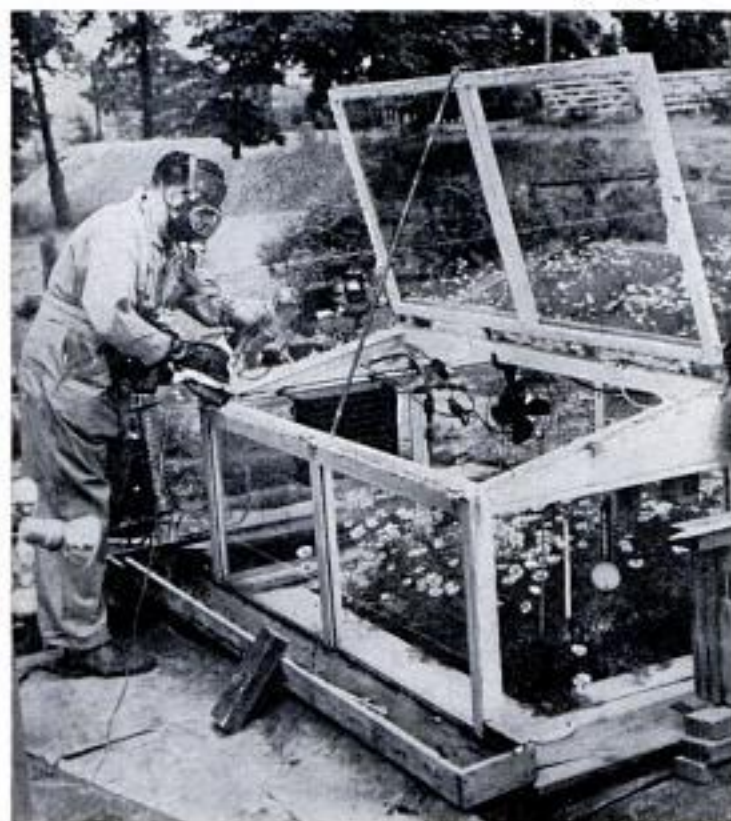


Electronic Nutcracker Severs Walnut Halves Without Damage

Powerful surges of electrical current crack walnuts in an Oregon plant. Two metal electrodes grasp each nut as it tumbles from a threaded feeder roll. A 65,000-

volt jolt passes between the electrodes, splitting the nut into undamaged halves. Following this, a vibrator conveyor severs the nutmeat from the shells.

Plants Raised in Radioactive Atmosphere Aid Tracer Studies



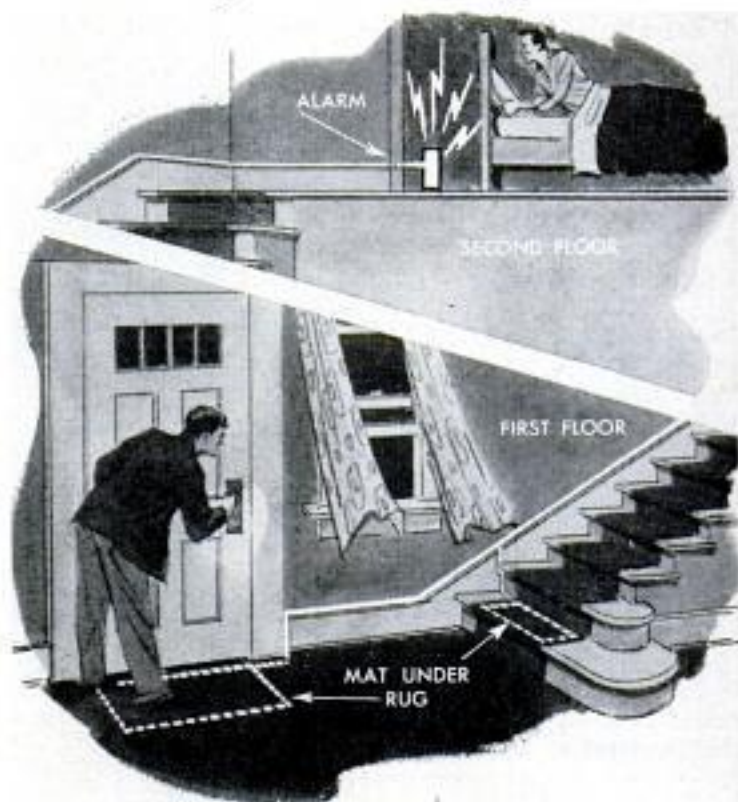
Rubber gloves, disposable clothing and a gas mask are standard garb when picking radioactive flowers at Gulf Oil Laboratories. The plants — pyrethrum flowers used in household insecticides — are raised in a dangerous atmosphere of radioactive gas for 56 days. The "hot" plant extract produced is traced to discover how pyrethrum kills flies, cockroaches and other insects.

Curved Meteor Film

Film curved in the shape of a bowl fits into a highly efficient meteor camera developed by Kodak for Harvard astronomers. The curved field is designed to provide the fastest possible speed. Operating on the same sky region as one of the earlier meteor cameras, the new camera photographed 56 meteors. In the same period, the older instrument could photograph only one meteor.

Electric Switch Mats Placed Under Rugs Set Off Burglar Alarm

Intruders are detected by wide, thin electric switch mats that can be placed under rugs or carpets at strategic locations within a house. One suggested place is in front of the most easily accessible door in the house, which will usually be unlocked by a burglar to insure himself a means of quick exit in case of discovery. The mat or mats are connected by a single pair of wires to a control box in the bedroom and the slightest pressure on any mat causes a buzzer to sound there, warning the householder. An attachment for additional protection, intended to scare away burglars, causes a bell to ring loudly when a mat is touched and to continue ringing until turned off. Any number of switch mats can be used with a single control box and additional ones can be added even after the system is installed. The connector can be plugged into any 110-volt outlet.



Plastic Drain Unit Features Trap That Unscrews Without Tools

No tools are needed to remove and replace the trap in a new polyethylene drain unit. A plugged trap can be taken off and cleaned in seconds. A few turns of the trap reseals it; no washers are necessary. The all-plastic unit is unaffected by acids and other corrosive materials, is germproof,

frostproof, and its surface is nonadherent. Designed especially for chemical and hospital laboratories, it consists of a stopper, high-level drain, strainer, lock-nut, plug, trap and outlet union. The unit can be installed in any laboratory or factory sink as well as home plumbing systems.

Willys Aero Jeep Matches Speed and Light Weight of "Mighty Mite"

Willys newest version of its famed war-time Jeep is a midget vehicle three feet shorter and 1200 pounds lighter, faster and more agile than its older brother. Like the Marine's Mighty Mite (*Popular Mechanics*,

May 1953), which it closely resembles, the little Jeep is designed for transport by helicopter or plane.

It is 100 inches long, 60 inches wide and 65 inches high. A 60-horsepower engine pushes it to 72 miles per hour. It can carry four men or a 500-pound cargo across the country, or 1000 pounds over highways. A nine-gallon gas tank gives it a cruising range of 239 miles.

The big weight saving in the 1475-pound Jeep is due to its aluminum and magnesium construction — the all-aluminum body weighs only 81 pounds, the magnesium wheels total 41 pounds. But 85 percent of its parts can be interchanged with those of a standard Jeep. Both Army and Marines are testing it.



←Aero Jeep, although three feet shorter than older Jeep, can also carry four men



Air Research and Development Command photo

Air Force Uses 10,000,000 Candlepower Light for Night Photos

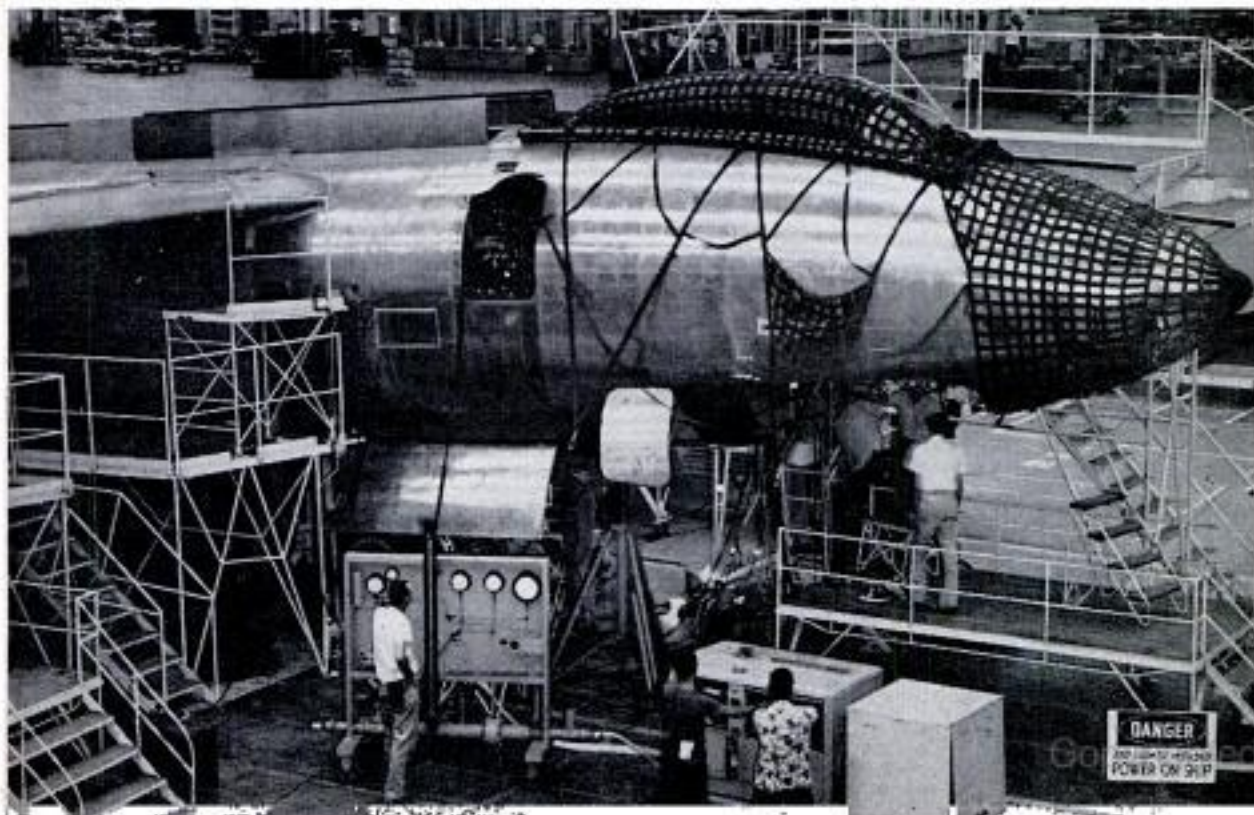
Light of nearly 10,000,000 candlepower is put out by a new device aiding low-altitude, high-speed aerial night photography. Contained in a 12-foot cylinder attached beneath the airplane's wing, the mechanism burns finely pulverized magnesium powder to provide the brilliant light for four minutes. It can be turned on and off by the pilot

and jettisoned if necessary. Built-in warning signals indicate anything wrong. The powder burns at an extremely high temperature and must be handled with care. Called the "Hell Roarer" because of the roar emitted when in operation, it was developed for the Air Force by scientists at Wesleyan University.

Heavy Webbing Muzzles Bombers During Pressurization Tests

Nylon muzzles now prevent Uncle Sam's big bombers from getting "vicious" during pressurization tests. Pulled over the nose and canopy, the socklike protector prevents a defective door or window from popping out and injuring test personnel when internal pressures are run up to more than

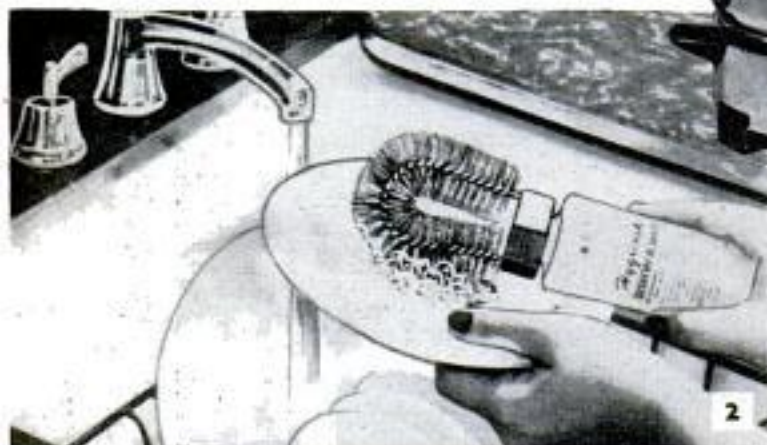
six pounds per square inch. It is made of nylon parachute-strap webbing. Its originator, Joe B. Gabriel, at Lockheed Aircraft's Marietta, Ga., plant got the idea while hiking up his socks. The muzzle replaces a cumbersome, steel bird-cage device and saves \$26 on every test run.



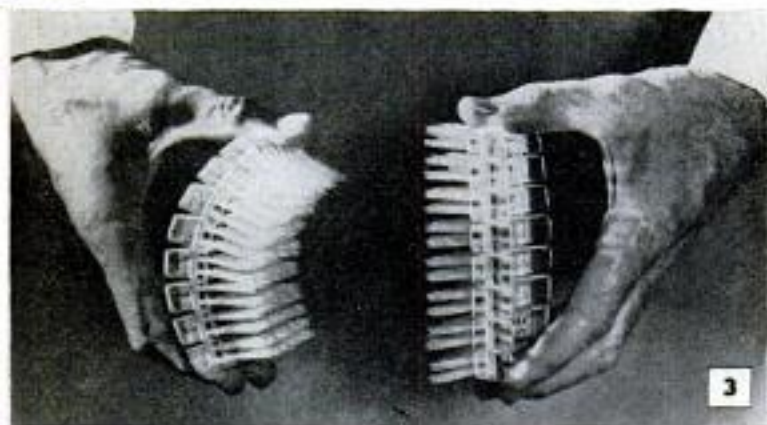
WHAT'S NEW FOR Your Home



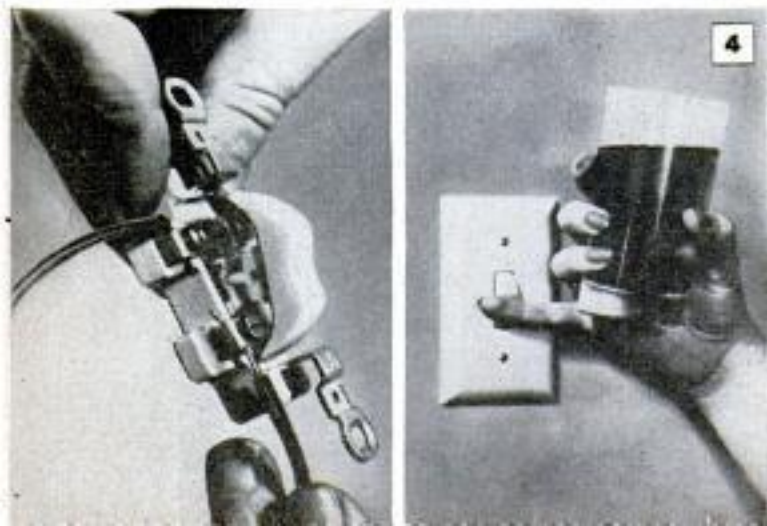
1. ELECTRIC COOKER serves as a deep fryer or general-purpose cooker, sits on the table. It bakes, steams, warms or deep-fries food and pops corn. The heat control can be set for a variety of temperatures. A light indicates when the proper temperature is reached. Glass lid allows you to see what's cooking



2. LOADED BRUSH dispenses aerated detergent suds at a squeeze of the flexible plastic handle. Brush head unscrews to permit filling of container with detergent and water. Suited to washing dishes, the brush can also be used to clean windows, rugs, woodwork and upholstery. Bristles are long-wearing



3. HAIR BRUSH bends to conform to head contour. The Lucite back, made in sections and held together with nylon rods, flexes so that all the bristles contact the scalp with every stroke. More effective stimulation of the scalp results, and the "plastered down" appearance of ordinary brushing is eliminated

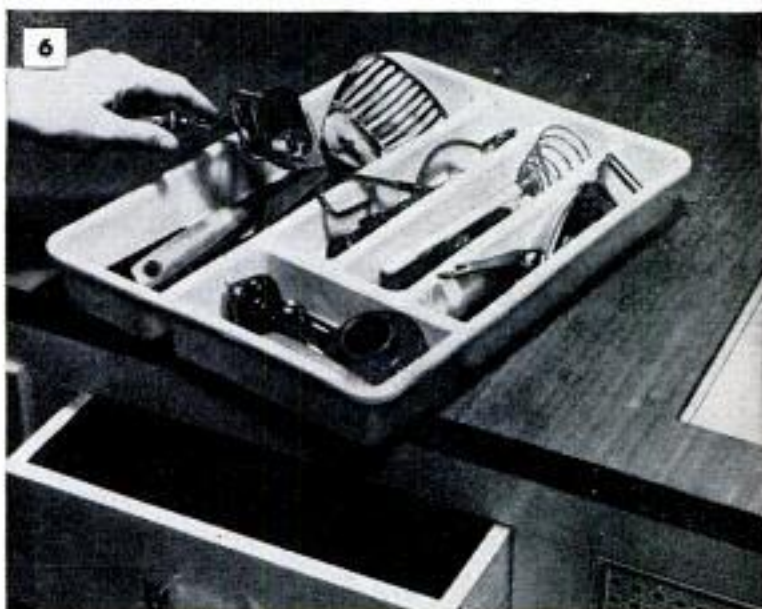


4. SILENT SWITCH snaps on or off at the touch of a finger and features an easy, sure method of making the connection. Instead of twisting the wires around the screws, you slip the wire's end under a flat contact plate. Tightening the screw brings the plate down in flat, positive contact with the wire

5. TIMER turns electrical appliances on and off at the same times daily without being reset. The unit has an "on" range of ½ hour to 23 hours and an "off" range of 1 hour to 23½ hours. Thus it can be used to cook a meal or defrost a refrigerator. A manual shut-off does not interfere with the setting

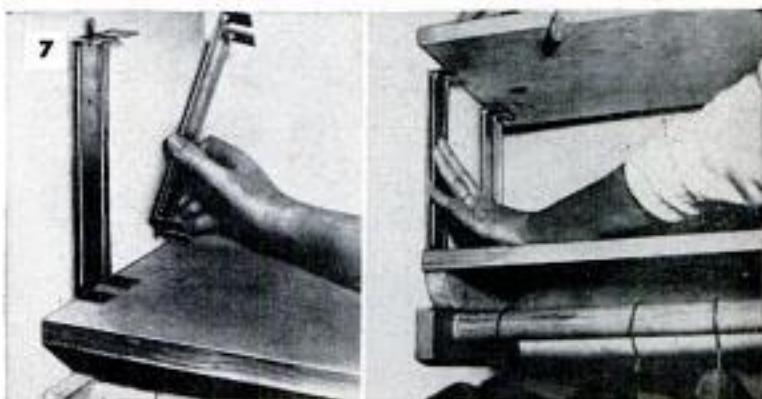


6. CUTLERY TRAY made of pliable plastic holds a variety of odd-shaped kitchen tools, is unbreakable and washable, lasts indefinitely. Cutlery can't harm the pliable material, which is noiseless and won't scrape table surfaces. The 12-by-16-inch tray fits any standard drawer, is available in red or yellow



7. SHELF SUPPORTS allow you to build your own shelves without tools, nails or screws. Supporting brackets rest against the wall on top of existing shelves. A tab on either end of each bracket fits between the wall and the end of the shelf board, locking it tightly in place. Length is eight inches

8. REVOLVING SHOE RACK makes it unnecessary for you to grope around the floor of your bedroom closet for shoes. Wire rack which fits in the bottom of closet holds six pairs of footgear. A touch of the finger whirls the desired pair into easy reach. Rack is 19 inches in diameter and 10 inches high



9. GUARD RAILS for medicine cabinets keep jars and bottles from tumbling out when you open the door. Clipped into place on existing shelves of glass or wood, they are installed without the use of tools. A combined rail and suspension bracket holds razors and shaving brushes within reach but out of the way





Quartered Skyscraper Suspended From Fins

Four hollow concrete fins rising 18 stories and intersecting in a cross support the weight of an office-apartment building in Bartlesville, Okla. Each floor is carried like a tray by the four arm-walls. Designed by Frank Lloyd Wright, the quartered building makes extensive use of cantilevers and lightweight aggregates. The hollow fins and floors accommodate the plumbing system, the automatic elevators and the air-conditioning ducts. Gold-tinted glass and 20-inch fixed copper vanes will cut the sun's glare—only indirect sunlight will be admitted. A 30-foot tower spire will provide television reception when the building is completed late in 1954.

Plywood Chair on Wheels Aids Crippled Children

Crippled children are moved about easily in a homemade plywood chair equipped with rubber-tired wheels. A removable play table provides space for food as well as books, coloring materials and other play articles. Under the seat is a large toy-storage section. The chair's inventor, Harry P. Speer, of Cedar Rapids, Iowa, has a son and three grandchildren who were victims of polio.



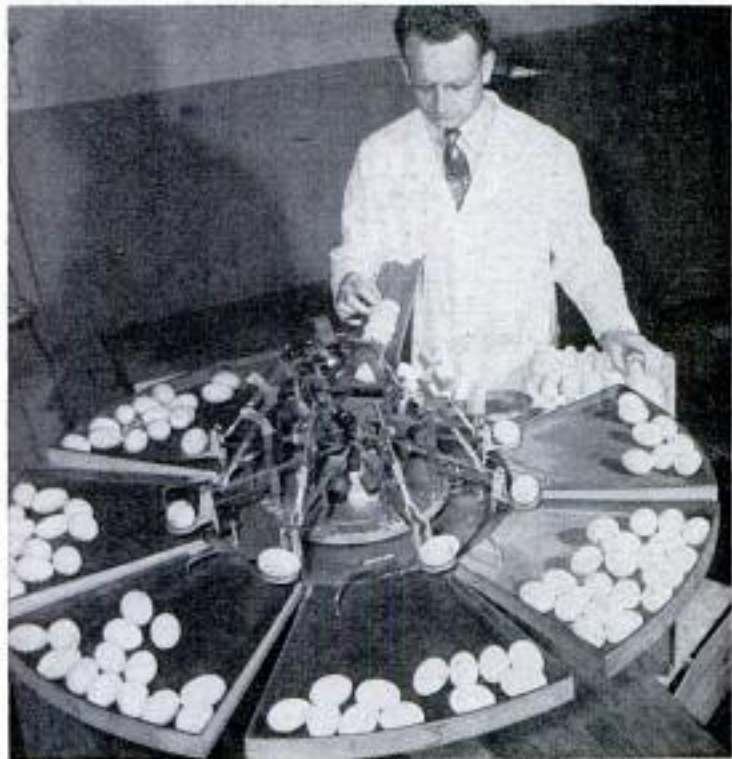
Electric Massage Chair Lessens Body Fatigue

Tired truck drivers and weary shoppers get a health treatment for a quarter from a coin-operated massage chair. The gentle, pulsating action of the vibrating back, seat and footrest unkinks sore muscles and aching backs and aids foot comfort. Some units are equipped with vibrating sides and arms to give an over-all treatment. Specially designed motors, motor mounts and floating panels operate within the equipment to induce circular, horizontal and vertical motion which lessens fatigue.



Photoelectric Cells Grade Eggs Into Six Shade Classifications

Eggs are sorted into six or more shell colors, ranging from white to dark brown, by the electric eyes of a new grading machine. Developed by the U.S. Department of Agriculture, the machine is sensitive enough to further divide white eggs into six shades between chalk and cream. An egg's color affects its price in certain areas, though color has no relation to its edible quality. The machine is based on the finding that brown shells reflect less blue light than white shells. A light beam is directed onto the egg as it passes over a candling device and two photoelectric cells, one sensitive in the blue and the other in the red portion of the spectrum, measure the reflected light. Activated by the light variations, a small motor and a system of cams and levers operate gates that drop each egg into its proper tray.



U. S. Department of Agriculture photo

Expert Predicts a Big Boost in Latin American Population

If its present rate of growth continues, Latin America will have three times as many people 47 years from now as it has today. Dr. Robert C. Cook, director of the Population Reference Bureau, Inc., recently said that Latin America is "the world's most explosive area of population growth."

Its growth rate is 2½ percent annually, compared to slightly more than one percent for the world. The estimated population of Latin America today, including the West Indies, is about 173,000,000, approximately equal to the combined populations of the United States and Canada.

Giant Drilling Barge Can Sink Well 20,000 Feet Deep



Towering four stories above the water, a giant floating drilling outfit is capable of drilling 20,000 feet below the surface. Described as the world's largest drilling barge by its builders, the unit has engines with an output of more than 5000 horsepower. It will be used for tapping oil fields beneath submerged areas and will operate in water up to 12 feet deep.

Coated Lamp Repels Insects

Fluorescent lamps are now available with a yellow coating that enables them to radiate the correct wavelength to repel all insects, as standard incandescent lamps now do at roadside stands, oil fields, gasoline stations and golf driving ranges. The tube is similar to the type now used in fluorescent light fixtures.



Thirty Irishmen With Shillelaghs



Beginning a game, sixteen scrimmagers in opposing rows await the ball—and action! Object is to disentangle the ball and send it flying toward enemy goal. Other players are stationed between center line and goals

GIVE 30 SPIRITED sons of Erin shillelaghs and room to use them, and you'll have either a fray on your hands or the national sport of hurling; perhaps a bit of both.

Hurling is a shin-cracking, wind-taking, fast sort of game that's been played in Ireland since ancient times—a sport halfway between lacrosse (from the North American Indians) and field hockey.

Fifteen men with cudgels stand on either side of the field, eight from each side facing each other in a scrimmage line at the center. The referee flings the ball between the

two teams. In a moment, sticks are swinging freely in an attempt to free the ball from the gantlet and whack it toward the goal posts. The ball may bounce from stick to stick; be struck with the hand or kicked; or caught in mid-air and sent flying again with a mighty whack of the shillelagh.

If a ball reaches the goal and soars over the crossbar it scores one point; if underneath, three points. After a goal, a member of the scored-upon team tosses the ball in the air, strikes it, and play continues. The battle lasts for an hour, with only a five-minute rest at the half. ★ ★ ★

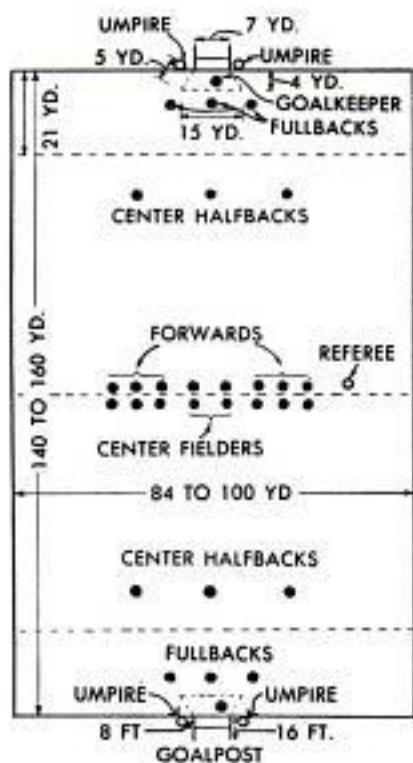


Diagram above shows hurling field with players in starting position. Not shown are linesmen—one on each side—who rule on possession of the ball when it goes out of bounds. Lines indicating 14 yards, 21 yards, 70 yards and halfway must be marked on field. Game is played all over Erin and in America by members of Gaelic Athletic Association. Soccer uses the same field and similar rules



A shot is blocked as a "horizontal" catches the swinging stick of a "vertical." Below, ball sails toward goal as goalie (most valuable man on either team) rushes to intercept it. Average player can knock ball 80 yards. Three points is scored if ball goes under crossbar



Fouled player gets a free shot as opposing team guards goal. He lifts ball from ground with stick, tosses it up and begins to swing. A hard hit coming up!



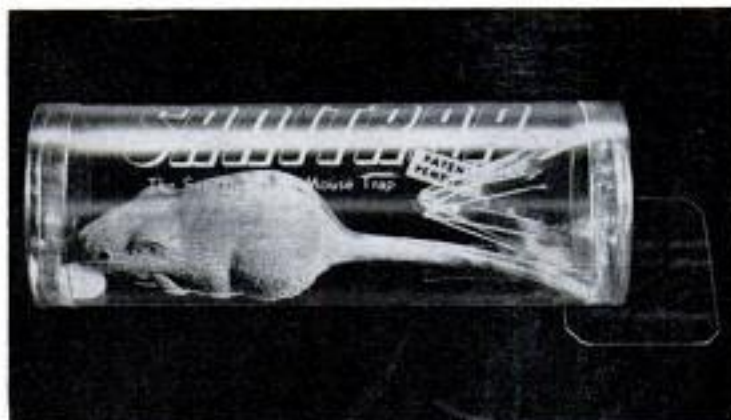
Revolving Fireplace Can Throw Heat to Different Parts of Room



Heat is thrown to different parts of the room by a homemade fireplace that can be turned in the direction of the dining, kitchen or living areas. Built from a steel tank four feet in diameter, it is mounted on a truck-wheel bearing and has brakes to prevent it from turning too fast. Mrs. Robert Thrun, a former student of architecture, designed the fireplace for her family's summer home at Sullivan, Me. A steel ring encircling the fireplace is grasped to change its position.

Disposable Mousetrap Holds Poisoned Bait

Quick death results for mice trapped by a disposable odorless mousetrap. It consists of a transparent plastic tube containing poisoned bait. The mouse enters the trap through a cone-shaped opening which closes after it, preventing retreat. The poisoned bait paralyzes the mouse and then kills it. Mouse and trap are then thrown away.



Pocket Calculator Aids Solution of Trigonometry Problems



Any problem in right-triangle trigonometry can be solved with a new pocket calculator that reduces all formulas to eight basic diagrams. The known quantities of a problem are printed in black on a typical right triangle, the unknown quantities are printed in red, making it simple to pick out the diagram that fits the problem at hand. The usual square-root tables are not required. The plastic calculator is designed especially for machinists, die makers and other craftsmen who need quick answers to mathematical problems.

Midget Gyros to Guide Missiles

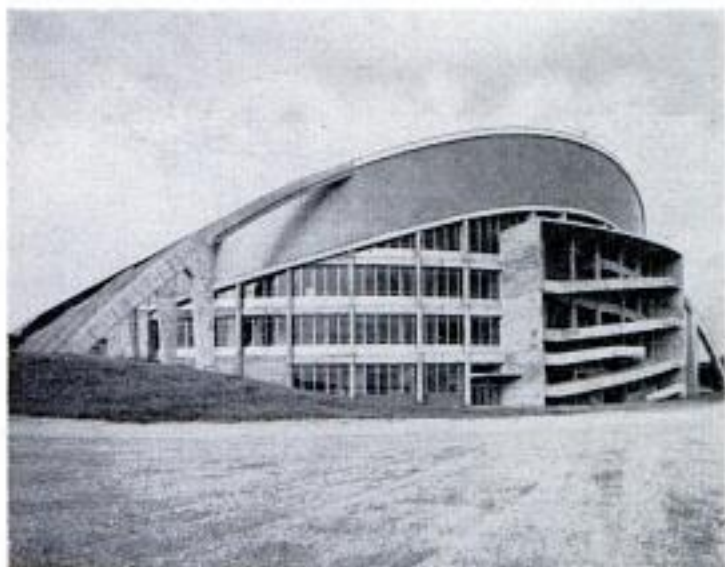
Giant guided missiles will soon be steered to targets with the help of toy-size gyroscopes. Less than an inch in diameter and weighing under three ounces, the new gyroscope's precision rotor comes up to a running speed of 24,000 revolutions per minute in less than 10 seconds. They will also be used in aircraft instruments and fire-control systems.



Interior scaffolds moved along on tracks as ribs were mounted and roof was laid. Arches at rear are unfinished

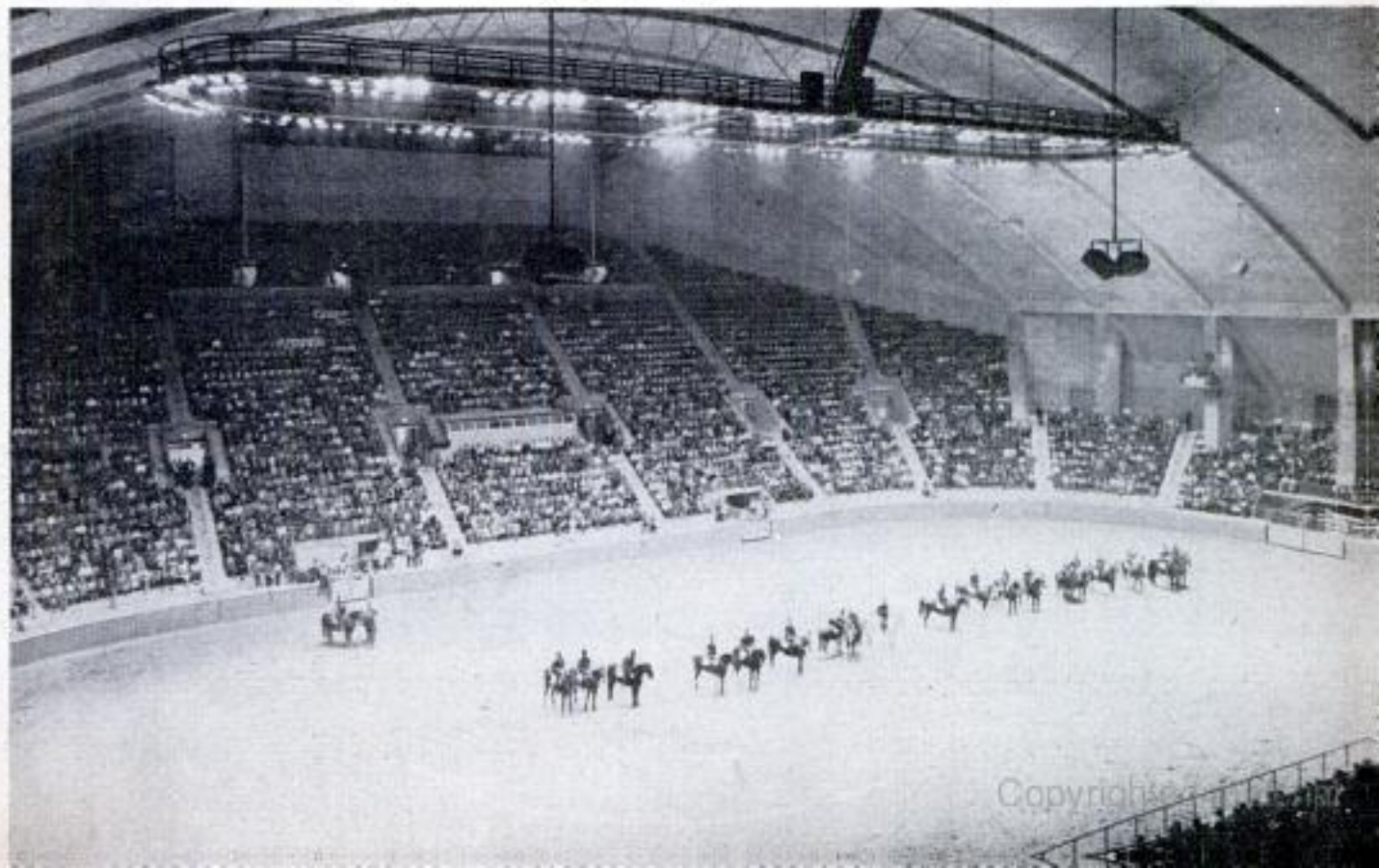
Coliseum Without Girders

REINFORCED CONCRETE forming the Quonset-like Alabama Agricultural Coliseum in Montgomery makes possible a building without major interior supports. Eleven concrete spans rising to a point 100 feet above the floor support a concrete roof only three inches thick. Ramps instead of stairways lead to the 9060 permanent seats, below which on either side are two levels for livestock and exhibition quarters. A central battery of overhead lights illuminates the 130-by-260-foot area, four overhead gas heaters warm it, and a public-address system fills the building with sound.

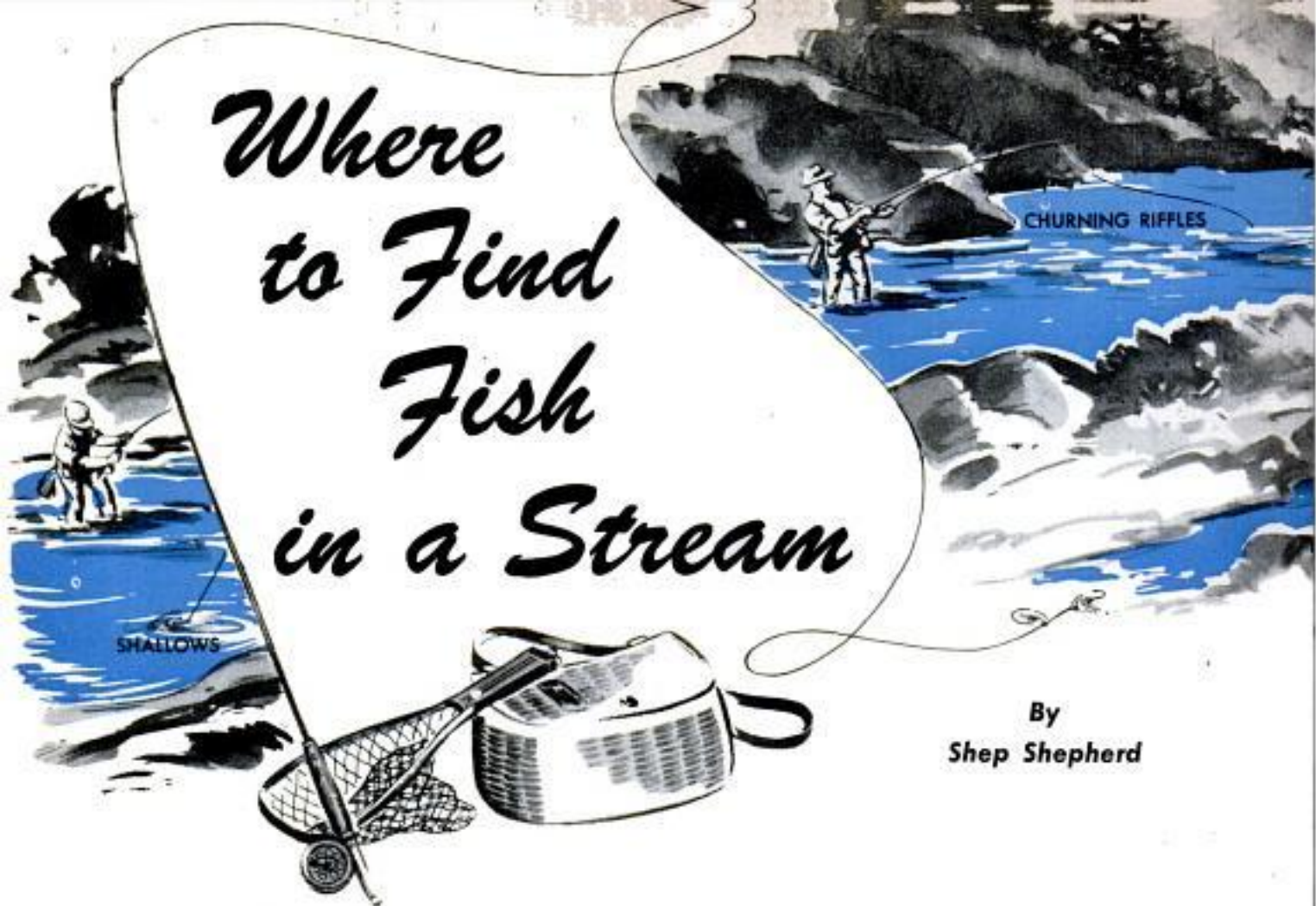


Glassed walls provide abundant sunlight for livestock pens and exhibition rooms below permanent seats. Note outside ramps

Horse shows, fairs and meetings keep arena busy. Lights, loudspeakers and heaters are suspended from ceiling



Where to Find Fish in a Stream



By
Shep Shepherd

OF THE 30,000,000 anglers who buy fishing licenses every year in the United States, surprisingly few give any time to a detailed study of the fish they hope to catch.

To catch fish, obviously, you must know where the fish are. Creel checks made by wardens along many of our favorite streams have shown that only an occasional angler fills out his limit while most anglers

go home with few or no fish. The fellow with the full creel didn't fill it on luck alone. He knew his stream, and where and how to fish it.

Fish are like people in two major respects. They have two demanding needs: food and shelter. To satisfy these two desires they seek out those spots in streams where food can be found and where there is also a certain amount of shelter from

On fast stream the angler tries pools near both rocks, then floats lure past fallen log into quieter water





fast currents and exposure. Fortunately for the wise angler, there are certain places in every stream that supply both needs.

Stream fish are wary, trout more so than bass though bass are skittish in exposed waters. Both fish tend to keep to the deeper, more sheltered waters where they are less likely to be seen from above, yet where the current brings food within reach. Often, when hungry, they move into shallow riffles to feed but dart to cover at the slightest sign of danger.

Many fishermen make two mistakes in stream fishing. First they go pounding up to the very bank of any pool they intend to fish, unwittingly scaring every fish in the pool. Fish can't hear normal sounds made above water. Loud talking won't disturb them, but walking or wading sends warning tremors through the ground and water that will put the fish down and stop feeding for quite some time. This is especially true on small streams running through

flatlands and meadows. On bigger, fast-moving streams there is less likelihood of scaring the fish by walking, but care must be used in wading to avoid dislodging rocks or creating unusual disturbances below the surface.

The average angler's second mistake is tramping from pool to pool, ignoring the shallow riffles between. The pools are the obvious places and apt to be overfished. Frequently you can put a good fish or two in the creel by floating a lure down through the riffles from a concealed position.

Most of our better fishing streams fall into two classifications — fast-moving streams flowing through mountains, heavily wooded terrain, and slower streams flowing through open, flat country. Let's take a look at both types of water for the signs that will locate fish.

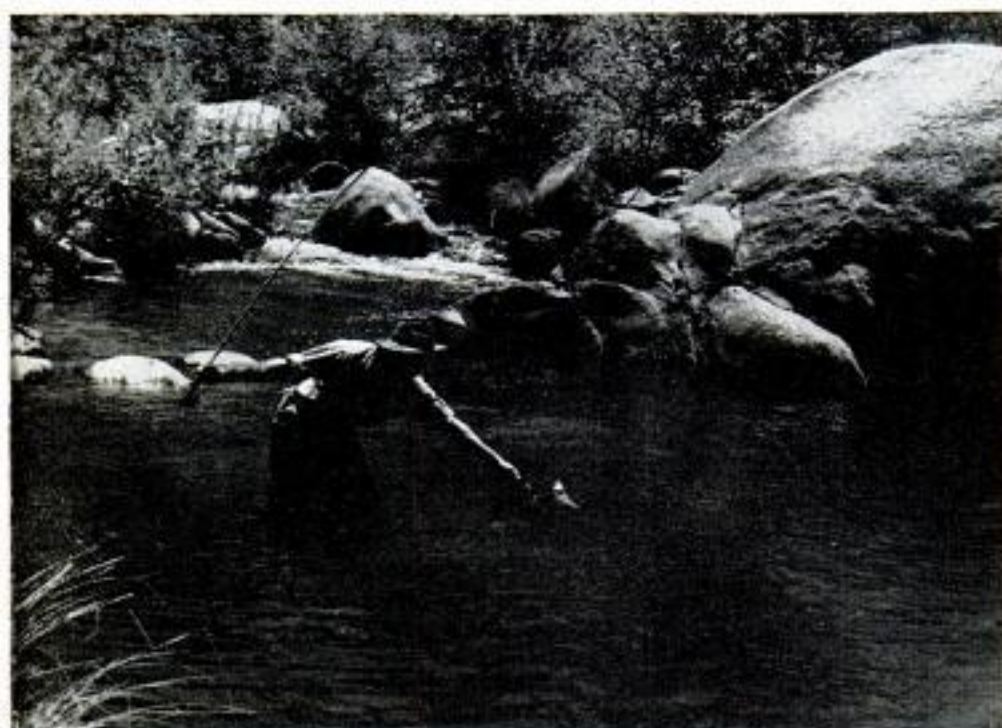
In fast streams, look for patches of quiet water where fish can rest without fighting the current. Such spots will occur behind

Fishing from above, he lets lure drift on current behind boulder. Another good bet is quiet water behind him





Before wading into the water, angler cast his lure into white water beyond rock and watched it drift into the pool where he now stands. In six casts he took two trout on this side of the rock. Now he's casting across stream into fast water and letting lure ride downstream to another eddy



Here he cast into the white water between the rocks upstream. The lure, without weight, rode into the deep pool just this side of the boulder. With a snap it was taken by a sizable bass. Since the fish fought across the pool, angler will leave temporarily and return later for another try

Beaver dams frequently provide topnotch fishing holes on a trout stream. Work quietly through the best cover to pool's edge, making sure you're not silhouetted against the sky. Use a natural bait since there is little current to move artificial lure. Casting is difficult—but often profitable

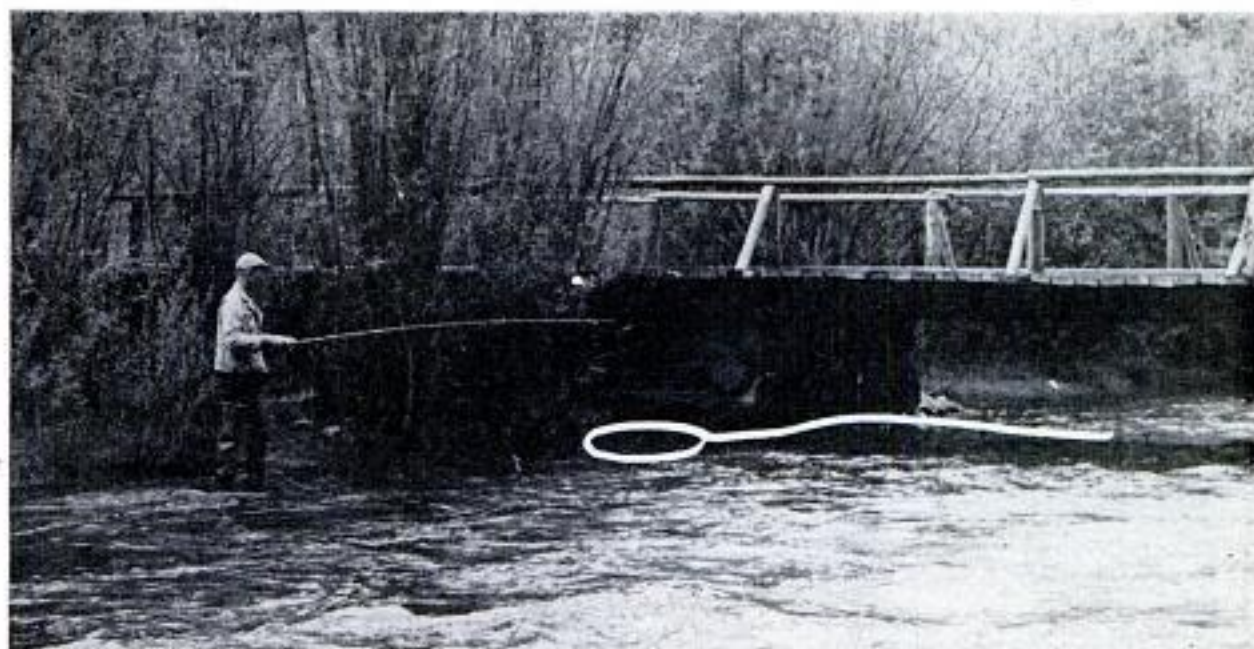


large rocks, jams, fallen trees, sunken logs, in eddies where the current sweeps around outcropping boulders and under banks where the stream bends. Any place where you see a patch of dark water in the midst of churning riffles is a good place for a lure.

In such spots as an eddy behind a rock, use a long rod if you have a choice, and a short line so the lure can be dropped above the quiet water, allowing the current to carry it right to the fish that may be waiting there for such a morsel. If you have to wade to get in position, approach from one side rather than from above. In fast water of this nature a fish isn't likely to see you and you can get quite close if you avoid dislodging rocks directly above the fish.

The kind of lure you use will depend on the time of year and water condition. Early in the season when the water is high and roily, the best bet is a natural lure such as worms, grubs or salmon eggs on some streams. Often a small spinner placed a few inches in front of the lure will help get a strike. If the water is clear and low, try wet flies and small streamers. Drop the fly into the current three or four feet above the rock and let it ride naturally with the current around the edge of the rock into the eddy. Keep the line just taut enough to be able to set the hook if a fish strikes but not taut enough to interfere with the natural float of the fly. Don't give up after the first try. Send the fly through the eddy several times from both sides of the rock, then try dropping it gently over the top. Sometimes this last trick gets a fish when the other has missed.

Places where trees have fallen into the stream



From upstream, work your lure under bridges, especially on hot sunny days when fish will be seeking the shade

make excellent feeding spots. Study the conditions here a few minutes to determine the best approach for your lure. If the tree trunk is submerged a few inches with water flowing over it put the lure in a few feet above that spot. Use no weight so the lure will flow naturally over the tree into the quieter water beyond. If part of the tree trunk is out of the water near the shore, allowing the current to swirl underneath it, float the lure through there a few times. Your lure will get snagged occasionally, but it will also get fish.

The V at the lower end of small islands in fast streams is frequently good for a fish or two. Cast the lure into fast water a little

above where it swirls into the eddy. That brings the lure to the waiting fish in exactly the manner it expects food to arrive. If you don't get a fish from one side of the V, cross the stream and try from the other side. Never make a cast so the leader falls across the quiet water.

Many of our back-country streams are crossed by old wooden bridges, which means that near-by waters are usually well fished since they are easily accessible. Oddly, however, many anglers fish near the bridges but few fish under them. It is a good place to try if the sun happens to be bright and the weather warm. Fish seek

(Continued to page 238)

From concealment behind tree, angler dropped lure straight down into pool and took a bass on his first try. Right, try small streams that meander across meadows, fishing cutbacks near banks where water is deepest



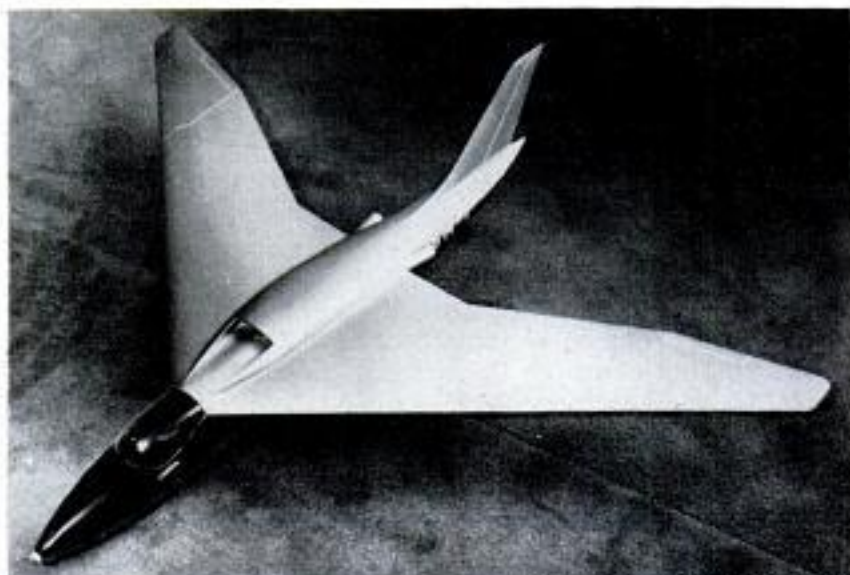
\$5000 Sport Car Has 205-Horsepower Engine, Glass-Fiber Body



Powerful, sleek and roomy, a sport convertible in limited production near San Francisco can be serviced anywhere in the United States. Called the "Edwards," it is built of standard American parts. The molded glass-fiber body is mounted on a shortened Ford chassis powered by a Lincoln 205-horsepower engine with a Lincoln Hydra-Matic transmission. The \$5000 car's wheelbase is 107 in., weight 2800 pounds.

British Sherpa Airplane Headed for High Places

Rotating wing-tip controls and a flexible wing distinguish the Short Sherpa, Britain's new high-altitude research aircraft. The wing is designed to deflect in bending, without twisting under its aerodynamic load. Two Turbomeca jet engines will power the plane. The air intake is located at the top of the fuselage, behind the pilot. Its name was inspired by Sherpa Sen Tensing, who last summer was one of the first two men to climb Mount Everest.



British Information Services photo

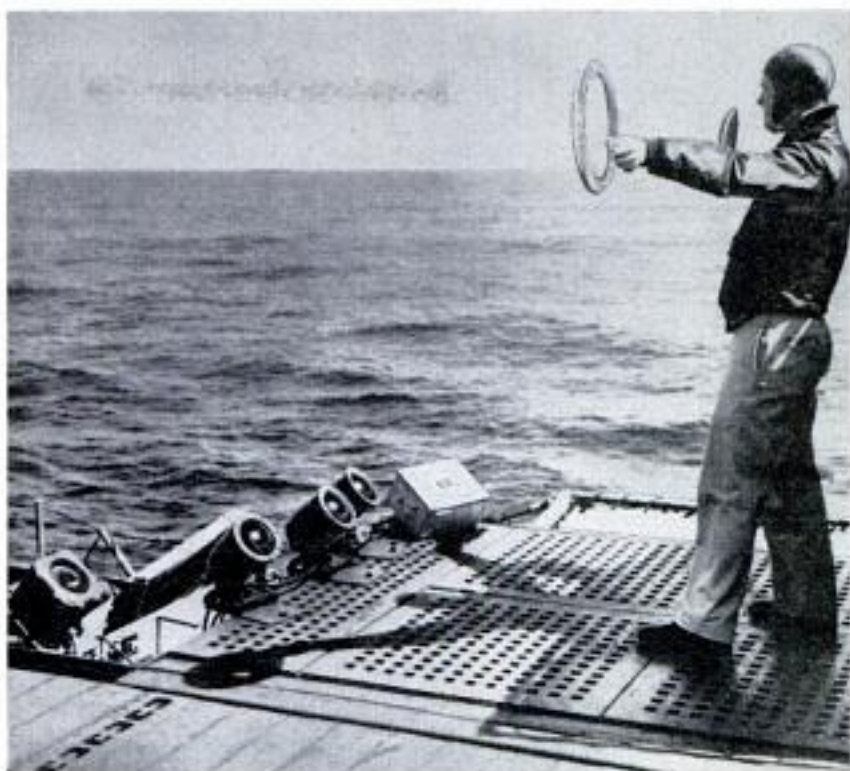
Jeep for Mail Carriers Mounts Steering Wheel on the Right



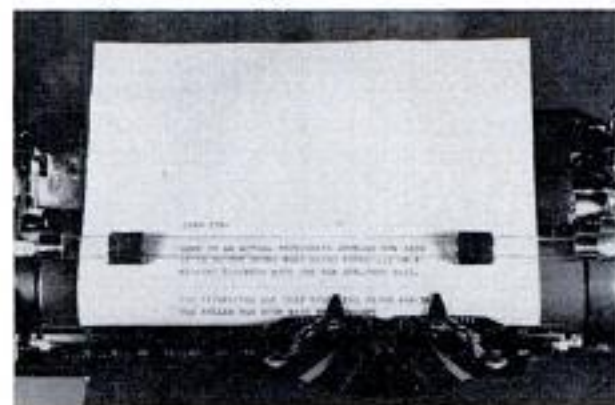
Right-side steering lends a Continental touch to a mail truck built by Willys for American use. Rural and suburban carriers save time with the truck because they don't have to slide across the seat to reach mailboxes. At the left of the driver is a handy shelf for sorting of the mail en route; the door on his right contains an oversize window so he can reach mailboxes of varying heights. The two-wheel drive delivery is also manufactured with the steering wheel on the left.

Navy's Shipboard Radar Gauges Speed of Landing Carrier Planes

Jet aircraft approaching carriers are "clocked" by an electronic device that indicates whether or not they are coming in at a safe landing speed. Installed on the carrier, it "watches" planes approaching for a landing and warns the landing signal officer if the plane's speed is too fast or too slow. The officer can then wig-wag orders to the pilot, either guiding him down or waving him off for another try. The Navy's new equipment takes into account the speeds of the aircraft as well as the carrier, coordinating this information with the wind's speed to give a reading of the plane's true air speed.



Transparent Typewriter Bar Aids Typist in Reading Copy



Typists can see every word on an unfinished page when the typewriter bar that holds the paper against the roller is transparent. Made of clear plastic, the bar doesn't have to be lifted to see what's under it.

Fingerprint Accompanies Check

Bad news for check forgers is a machine which takes your fingerprint on a roll of chemically treated paper and develops a picture of the print. The photo is attached to the check for further reference.

Rubber Raft Scoots Across Ice or Water to Rescue Drowning Skater

Rescuing a skater who has fallen through the ice isn't so difficult with a lightweight rubber raft used by police in Hamburg, Germany. The raft can be paddled across open water or pulled along on top of thin ice that wouldn't support a man's weight. A multi-prong hook is thrown out in front of the raft and digs into the ice so the rescuer can take up the rope and move the craft. Precious minutes are saved by using the raft.





Disaster unit carries portable power unit and winch, axes, ladders, stretchers and aluminum boat on roof

Mobile Disaster Unit Carries Rescue and First-Aid Equipment



Communication section in front of trailer has two-way radio, portable phones and public-address unit

EQUIPMENT for handling first-aid and rescue work in almost any emergency is carried in a mobile disaster unit built for the city of Marshfield, Wis. The 43-foot-long unit consists of a house trailer and truck that can speed along at 50 miles per hour. The trailer is equipped with stove, sink and refrigerator, and was built to serve as an emergency hospital and communication center. Medical equipment includes an examination table bolted to the floor, surgical tools and medical supplies, oxygen and plasma, resuscitation outfit, splints and blankets. The communication system has an FM transmitter and receiver plus two walk-around radio phones and a public-address system.

Left, portable power plant and oxyacetylene unit are stored in truck body; right, resuscitation outfit



Radio Television Electronics

FOR SAKE OF THE RECORD

By Emanuel J. Marcus

MINIMIZING record wear is of interest to every owner of record-playing equipment. If you are a record collector you have an important investment well worth protecting. For a serious listener it usually runs into several hundred dollars.

Record grooves are delicate and can be quickly damaged by worn out chisel-shaped playback needles. Accordingly, it makes sense to play your valuable, and hard-to-get, records with a small ball-shaped stylus tip of the most durable material. Stylus and record engineers, and manufacturers, have always realized this and have selected more and more durable materials to use as phonograph styli. Only in recent years, through the production of reasonably priced diamond styli, has this material been available for the general public, although it has always been preferred by professional users.

The stylus and the groove are the only parts of the entire system which are subject to rapid physical deterioration. Pressures exerted between the two are in tons per square inch; groove distance traveled on one LP (long playing) record is almost one mile in length, and stylus vibrations run over 20,000 cycles per second. Figs. 1 and 2 illustrate very clearly the cause and remedy for minimizing record wear. The worn stylus sinks into the groove and sharp cutting edges cause high surface noise and rapid deterioration of record life. The young lady in photo A is using a stylus inspection microscope. Photo B shows an osmium needle after 12½ hours play; the sapphire needle C has been used 40 hours, while the diamond stylus, photo D, is pictured after having been in use 700 hours.



"Electronics Made Easy"

1954 "LITTLE GIANT" LOW-COST

By Lothar Stern

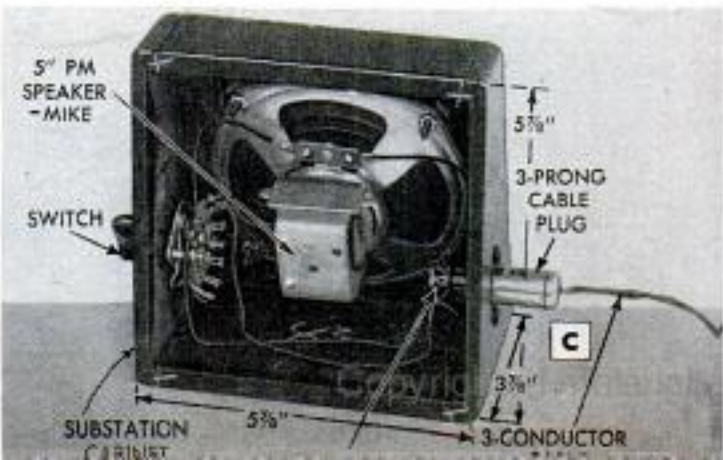
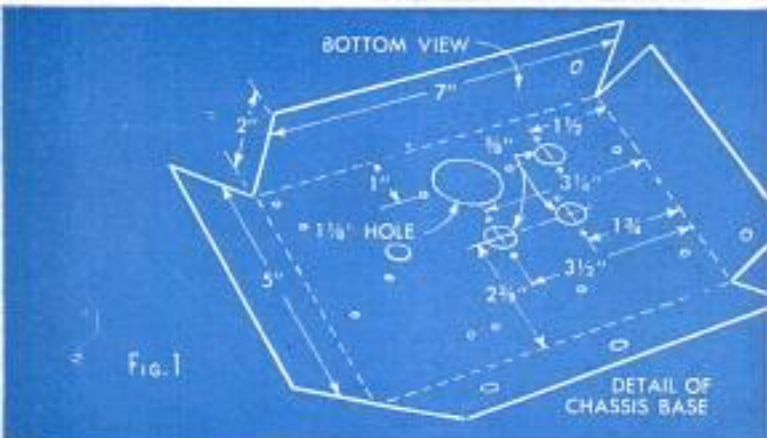
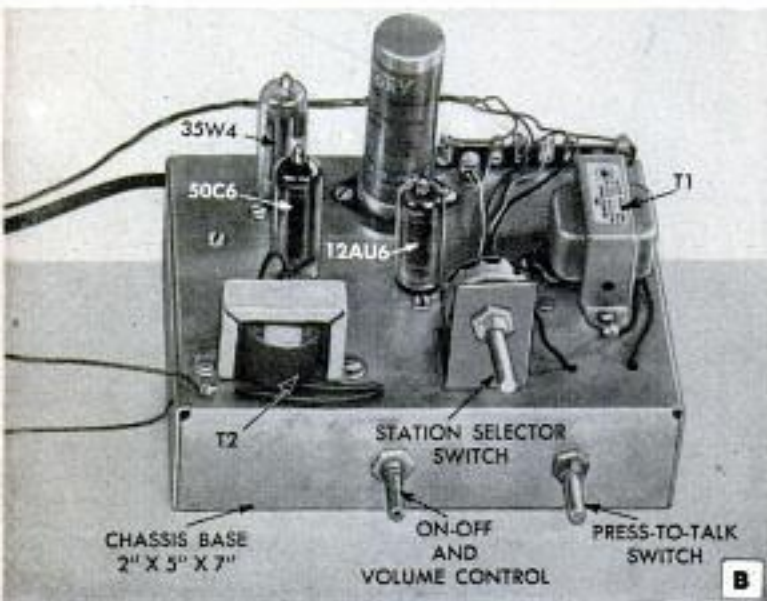
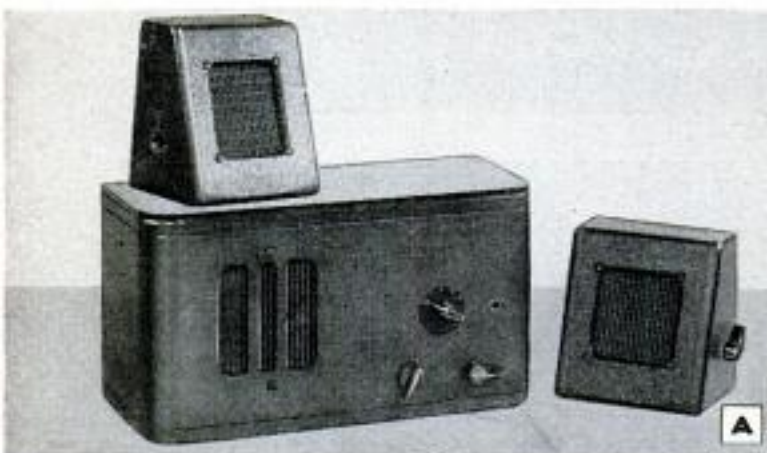
I NTERROOM communications systems have a wide variety of uses in homes, schools, factories and offices, or anywhere that instant communication between two or more widely separated points is required, as illustrated. This particular system was designed to include one master station and from one to four substations. The master station can call or listen in on any of the substations while each substation can originate a call to the master station. If desired, all sounds from the remote stations can be shut out from the master station, yet calls may be received from any of the substations, if necessary.

In spite of the versatility of the system, it is relatively simple and inexpensive to build. Even if all parts are purchased new, the cost of the master station is less than \$22.00, while each substation can be constructed for about \$7.00. Since none of the component values is particularly critical, many of the parts can be salvaged from the "junk box," or from an old radio that has been discarded. For these reasons, this versatile and useful construction article was selected for the 1954 annual "Little Giant" project for advancing radio students and experimenters.

The circuit consists of a two-stage amplifier, an a.c.-d.c. power supply and a simple switching arrangement. The student will note that in tracing the path of the signal on the schematic-circuit diagram, Fig. 2, it is seen that with the press-to-talk switch (S1) in the listen position as shown, the substation is connected through the selector switch (S2) directly across the primary of the intercom input transformer T1. The intercom transformer used in the model was a Stancor type A-4744; these

RESISTORS

- R1 10-OHMS, 1/2-WATT
 - R2 10-MEGOHMS, 1/2-WATT
 - R3 1-MEGOHM, 1/2-WATT
 - R4 470,000-OHMS, 1/2-WATT
 - R5 1-MEGOHM VOLUME CONTROL—(MALLORY U-53)
 - R6 150-OHMS, 1/2-WATT
 - R7 4700-OHMS, 1/2-WATT
 - R8 220-OHMS, 1/2-WATT
 - R9 150-OHMS, 10-WATTS W.W.
- No. 1 TAPER



BACK-LOADED CABINET FOR SUPER-FIDELITY HOME PHONO

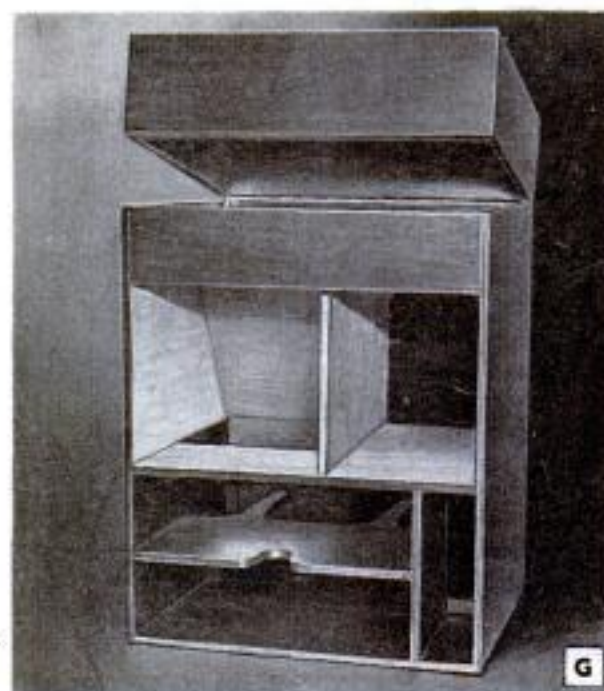
(Continued from February issue)

NOW THAT the amplifier has been completed, we are ready to house it, and the 3-speed record player, in the back-loaded chairside cabinet, photo G. All joints must be glued and nailed. Plywood of $\frac{3}{8}$ -in. thickness is specified and with built-in bracing this thickness is sufficient without adding unnecessary weight.

The assembly order should be as follows: Item 11 (back, bottom) is fastened to item 3 (speaker floor). Then assemble item 5 (speaker side) and item 10 (deflector). Next, the left side panel, and item 7 (record shelf). Item 8 (7-in. album spacer) can be glued and nailed in place. From here on, no preference as to order.

In assembling the cabinet, allow $7\frac{1}{10}$ -in. width in the amplifier compartment to allow easy insertion of the 7-in.-wide amplifier chassis. Follow Figs. 6 and 7 and check with the list of cabinet items. The amplifier-speaker panel is detailed in Fig. 8. Holes A and A, are counterbored 1-in. diameter from the back, with a $\frac{1}{2}$ -in. hole through the front. The red dial-light jewel is pressed into the $\frac{7}{8}$ -in. hole; the socket clamp for the lamp is held to the back of the panel with short wood screws. Note the groove for the speaker wires in Fig. 6 assembly; panel item 6 in Fig. 7 mounts tight against item 5, therefore space for the wires from the speaker to the amplifier must be provided. Three wood screws hold the speaker-amplifier panel (item 6) in place in the cabinet. A flat-head screw is inserted from the bottom,

(Continued to page 244)



LIST OF CABINET ITEMS

Item	Req'd	Description	Reference
①	2	Sides	15" X 20 $\frac{3}{4}$ " X $\frac{3}{8}$ "
②	1	Phono floor	15 $\frac{7}{8}$ " X 14 $\frac{1}{4}$ " X $\frac{3}{8}$ "
③	1	Speaker floor	15 $\frac{7}{8}$ " X 14 $\frac{1}{4}$ " X $\frac{3}{8}$ "
④	1	Bottom	15 $\frac{7}{8}$ " X 14 $\frac{1}{4}$ " X $\frac{3}{8}$ "
⑤	1	Speaker side	8 $\frac{1}{2}$ " X 13 $\frac{1}{4}$ " X $\frac{3}{8}$ "
⑥	1	Spkr. and amp. panel	8 $\frac{3}{4}$ " X 15 $\frac{3}{4}$ " X $\frac{3}{8}$ "
⑦	1	Record shelf	13" X 14 $\frac{1}{4}$ " X $\frac{3}{8}$ "
⑧	1	7-in. album spacer	7 $\frac{7}{8}$ " X 7 $\frac{7}{8}$ " X $\frac{3}{8}$ "
⑨	2	Top, back and front	15 $\frac{7}{8}$ " X 3 $\frac{3}{8}$ " X $\frac{3}{8}$ "
⑩	1	Deflector (baffle)	8 $\frac{3}{4}$ " X 10" X $\frac{3}{8}$ "
⑪	1	Back, bottom	15 $\frac{7}{8}$ " X 8 $\frac{3}{8}$ " X $\frac{3}{8}$ "
⑫	1	Top of lid	16 $\frac{1}{8}$ " X 15" X $\frac{3}{8}$ "
⑬	2	Front and back lid	16 $\frac{1}{8}$ " X 4 $\frac{3}{8}$ " X $\frac{3}{8}$ "
⑭	2	Side of lid	14 $\frac{1}{4}$ " X 4 $\frac{3}{8}$ " X $\frac{3}{8}$ "
⑮	1	Album stop	2 $\frac{1}{4}$ " X $\frac{1}{2}$ " X $\frac{3}{4}$ "
⑯	1	Piano hinge	14"

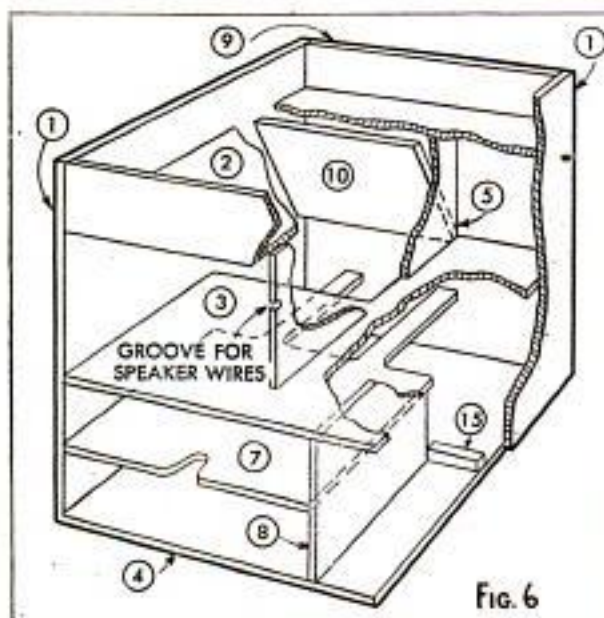


FIG. 6

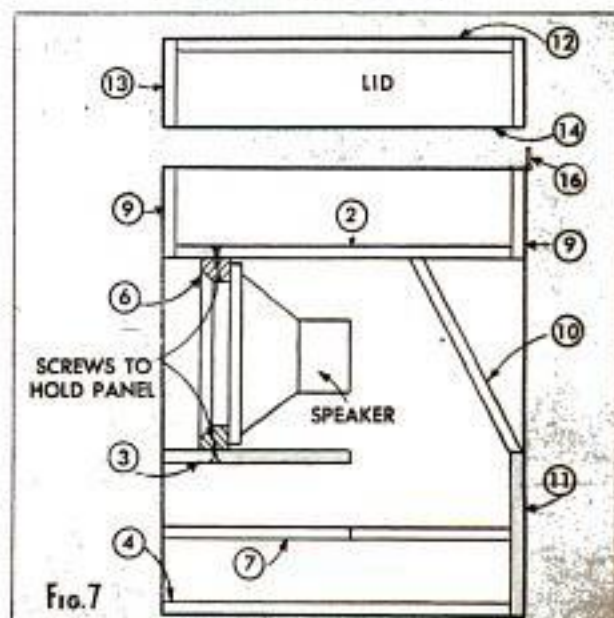


FIG. 7

the POPULAR MECHANICS CRAFTSMAN

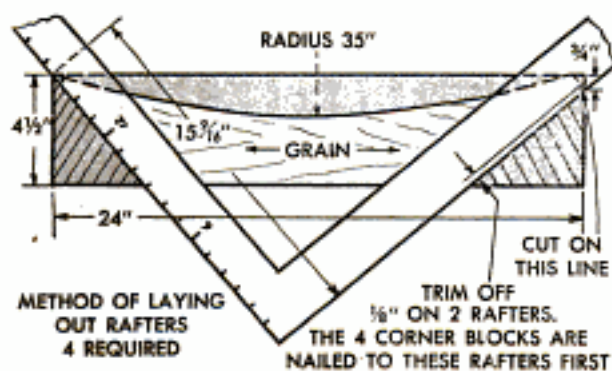
There's plenty of room for feathered visitors and no nest-cleaning problems with this

MARTIN MOTEL

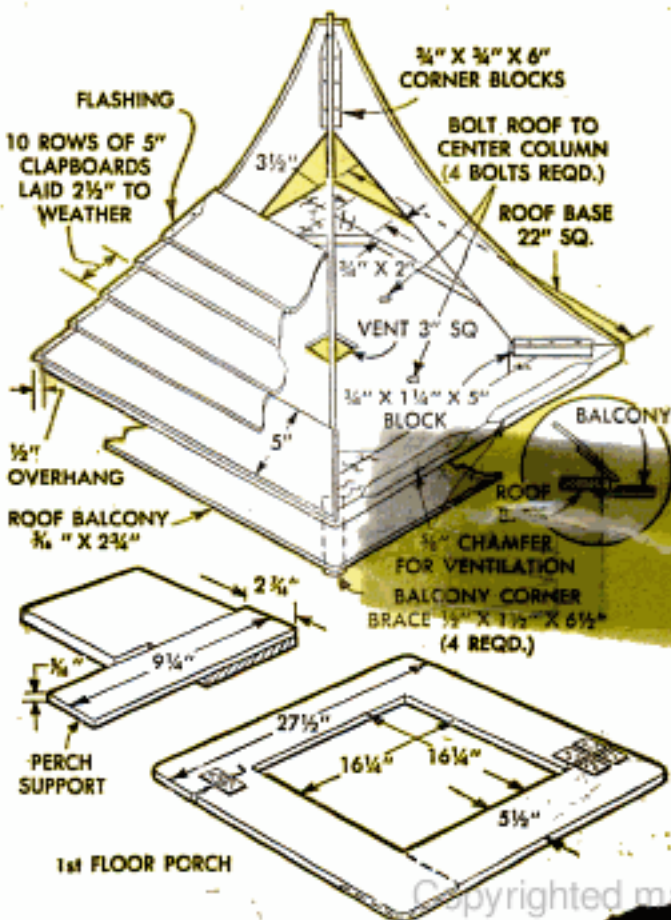
LATE in April, when martins are winging northward, they will be attracted to your yard or garden by this unusual martin house. Since the nest sections are easily removed, cleaning and storing them are simple operations.

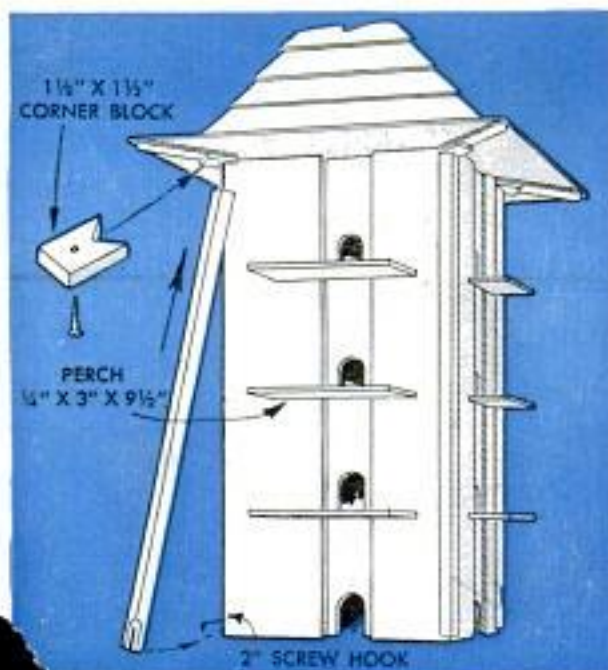
Begin construction by cutting the nest floors and ceilings to the dimensions shown on page 162. Then attach the perch supports, as detailed at the right. Four nest sections are needed, so four sets of floors must be made. Each section is assembled after the sides have been cut to the proper size. The best way to begin assembly is to fasten the entrance-hole strip to the floors first and then add the other side pieces. The guide strips at the top of each box and the ceiling braces near them should be positioned carefully, as these must fit snugly into the center supporting column.

Next, the supporting column is made. The center of this column is an air shaft which ventilates each nest by means of $\frac{1}{2}$ -in. holes in the back wall. Note bolt holes drilled in the hardwood cleats at the bottom of the column. These are for the bolts which secure the column to a wooden disk or cross fastened to the end of a 15 to 25-ft. pole on which the house is mounted. The base of the roof consists of a 22-in. sq. frame of $\frac{3}{4}$ x 2-in. members which is faced on the bottom with a panel of $\frac{1}{4}$ -in. exterior plywood. Before finishing the roof, set the roof-frame assembly on the supporting column and locate and drill the holes through which the roof is bolted to the column. Now the roof is completed as detailed at the right. Orange-crate slats make



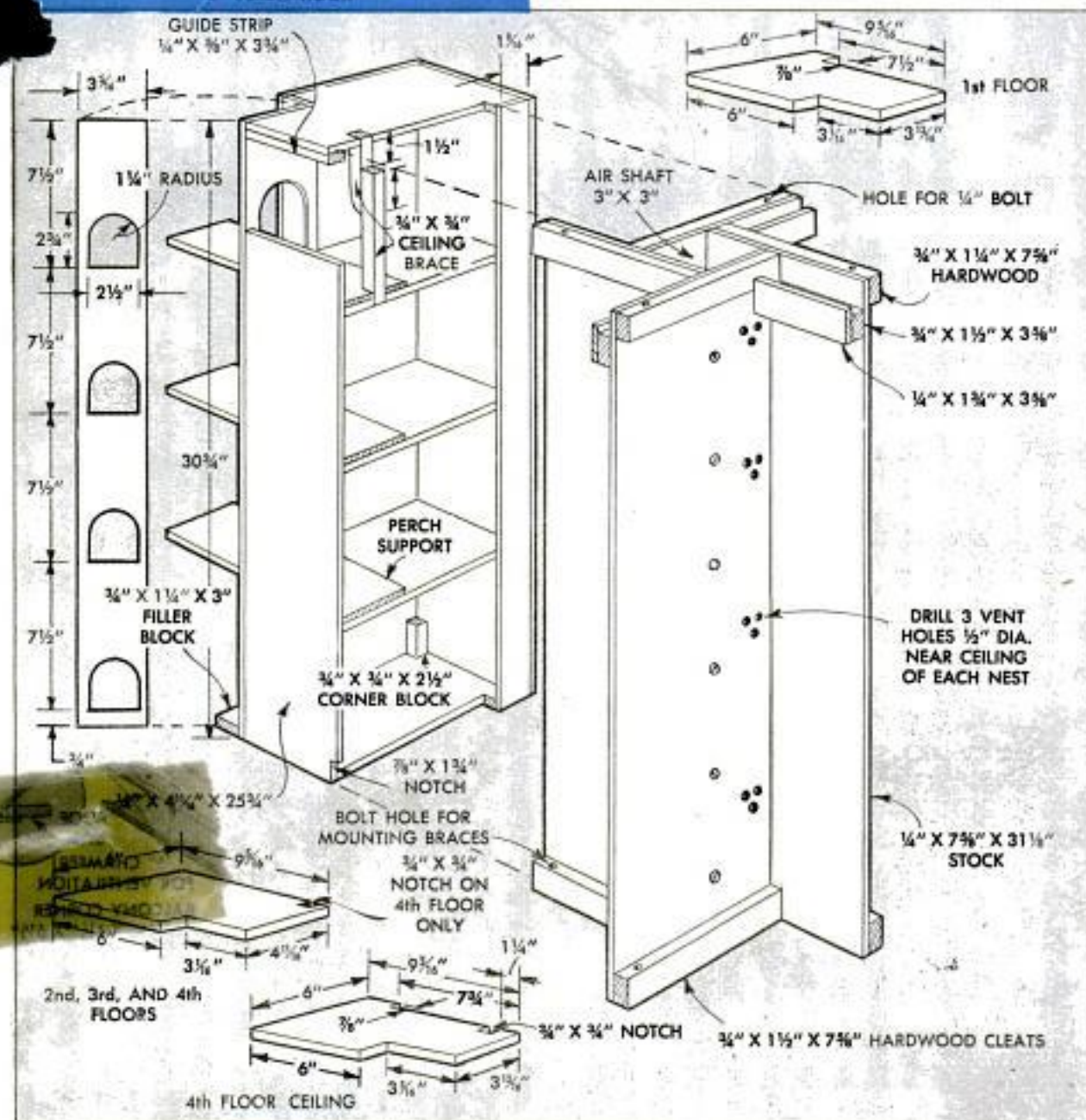
By
A. L. Mills



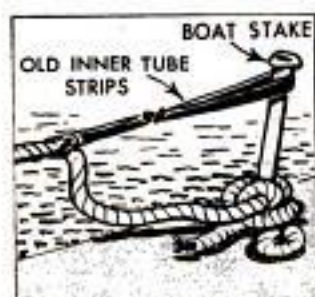


ideal clapboards for covering the roof. Finally, a drip cap, 3/4 in. thick and 4 1/2 in. sq. is made to cover the open end of the roof. Any finial you desire can be attached to this, and four dowel perches inserted in it, as seen in the sketch at the top of the first page.

The nest sections are now placed in position on the supporting column. These are held together by small flat hooks fastened to the underside. Four corner posts are cut from 1 1/2-in. L-shaped molding, the length of each determined by cutting and fitting. A slot in the bottom of each post fits over a 2-in. screw hook, and the top of the post engages a notched corner block. Finally, the first-floor porch is assembled and held in place by four turn buttons screwed to the bottom of the nest sections. Two sides of it are hinged so that it can be removed easily when cleaning the nests. ★ ★ ★



Slack in Mooring Lines of Boat Taken Up by Rubber Band



Large rubber bands cut from an inner tube can be used to take up the slack of a mooring line for a small boat. Tied between the mooring stake and the line in the manner shown, the rubber

will take up the slack when the rope is loose, but it will allow the rope to take the full strain when the rope is extended. By keeping the mooring line out of the water, the rubber band prevents the line from becoming waterlogged with each rise and fall of the tide, thus helping to avoid eventual rotting and parting of the line.—George Brook Taylor, Daytona Beach, Fla.

Hose Section Over Hoe Handle Measures Garden Rows



When marking out garden rows, or setting out bushes and plants, the job of spacing them properly can be simplified if a small section of garden hose is split and slipped

over the handle of your hoe. In laying out a vegetable bed, for example, the first two rows can be marked. Then the hose section is moved along the hoe handle until it indicates the distance between rows. As you move down the rows, this measurement can be used to make sure the same distance is maintained between rows.

Postage Stamps Carried Conveniently Inside Pen Barrel



Turn Button on Workbench Aligns Boards for Marking

When marking wood on your workbench against a pattern or template, the job will go much faster if the end of the bench is fitted with a turn button against which the work and the pattern can be butted simultaneously. When not in use, the button turns so as to be out of the way. For further convenience, a yardstick can be fitted to the edge of bench, as shown, to be used in conjunction with the turn button.

Removing Grease Spots From Rugs

To remove grease spots from rugs and upholstered furniture, add water to baking soda to make a paste and rub liberal amounts into the spotted areas. Allow the paste to dry and then remove with either a brush, vacuum cleaner or carpet sweeper. Repeat this operation several times if stain is stubborn.

Ted Otsu, Vancouver, B. C., Can.

As many as a dozen postage stamps can be carried inside some types of ball-point pens without affecting their usefulness. Open the pen, as shown in the photo, by unscrewing the upper portion of the barrel from the lower end. Then curl a strip of stamps so it fits inside the pen barrel and around the ink cartridge. Then reassemble the pen and use in the normal manner.

Ken Murray, Colon, Mich.

☐ Spar or quick-drying varnish should be used on rattan furniture that may be exposed to sunlight and rain. Clear lacquer or white shellac, may be used if the furniture is to be used indoors.



Martin



Johnson

Here Come the **OUTBOARDS**

Part I—By Frank N. Stephany

WITH TRAFFIC-JAMMED highways quickly making "driving for the fun of it" a thing of the past, millions of average Americans are turning to outboard boating as one of the most enjoyable and relaxing ways of spending their vacations and summertime weekends. They're getting out on the thousands of lakes and rivers where there is still plenty of elbow room. And they're discovering in rapidly increasing numbers that outboard boating is a sport that the whole family can enjoy.

The development of the outboard motor from the troublesome noisemaker of the past to the dependable, economical power plant of the present has contributed more than any other factor to the popularity of boating. Many outboard boaters own both motor and boat, while others have their own motors and simply rent a suitable boat when and where they have need for it.

The easily handled, two-wheel car trailer has done much to spread the boating fever. With these trailers, anchorage or



Champion



Mercury



Evinrude



Bucchignani



Couple of fishing rods and an outboard motor-boat are perfect ingredients for summer family outings

Fastening safety chain to motor, as below, saves watching it sink to bottom in case clamps work loose

docking space is no longer a must, as the boat can be "docked" right in the garage or backyard and trailed many miles, if necessary, to almost any body of water that the boater wants to navigate. The trailers are designed so that one or two people can launch a good-sized boat without difficulty.

Among the many improvements on the outboard motors themselves have been the incorporation of twist-grip speed controls and the gear shift. This has been done even on some of the smaller motors. Of more interest to the fisherman and the man who likes to take his family and friends cruising, is the ear-pleasing quietness that some motors have achieved by means of engine mufflers and a new cushioning feature. This brings the noise level of the motors down to the point where passengers can hold conversations in normal tones of voice even while running their boat at full throttle. New streamlined housings are easy to open for servicing and, if you have not



Photo below shows a 14-ft. utility boat powered by a 25-hp. motor being pulled from launching ramp after day's outing. This type of 2-wheel trailer has made outboarding practical for thousands of people

Certain photos and information courtesy of the Outboard Boating Club of America



MARCH 1954





If the car can't be backed to the water, even a boat-and-trailer outfit as large as this one often can be wheeled into launching position by hand



Launching the boat from the trailer is seldom more than a one-man job. Though necessary in this case, trailer frequently does not enter water this far

operated an outboard in recent years, you probably will be surprised at the ease of starting—the automatic-rewind starters have won the outboard-boater's battle with the pull rope. Plug-in fuel tanks that give much-wanted extra hours of cruising, clamp-on remote controls, an automatic boat bailer and, for larger motors, an electric starter are additional features that add to the enjoyment and convenience of outboard boating. Now, too, many of the larger motors are so versatile that they will drive the boat at 20 to 30 m.p.h. and still give fine performance at trolling speeds.

If you're thinking about buying a motor, you'll find a number of excellent brands on the market. There are several things that will determine the size of motor required. One of the first considerations is whether or not you want speed and, then, the size and type of boat on which the motor is to be used. The smallest of the motors, which are available as low as 1½ hp., are intended primarily for dinghies, prams and canoes. The 5 to 7½-hp. class is most popular and that, of course, is because this size of motor

Utility boat has a small forward deck and usually a V-shaped planing-type hull. Capable of fair speed



Hydroplanes are made in a variety of designs, all of them intended for racing. Handle largest motors



is suitable for the average-sized rowboat, car-top boat and the smaller utility boats frequently found in summer-resort areas. Though it always is safest to check your boat for seaworthiness, take special care to see that a borrowed or rented hull is in good condition before mounting a motor of this size on the transom. If a motor larger than this is to be used, it is wise to use it only on a hull that is designed to handle that much power. The 10 to 25-hp. motors are intended for the larger utility craft, runabouts, cruisers and hydroplanes, and these normally would be selected for a particular hull. Another thing to keep in mind is that the weight of the motor will be an important factor if you intend to carry it around in the trunk of your car. Outboard motors are designed to be as light as possible, but the chore of lifting a heavy motor in and out of the trunk and carrying it down to the boat may not be worth the extra speed.

The horsepower of the outboard motor should be balanced with the size of the boat. So, if you buy both, get a boat and

Runabout is faster and fancier than utility boat with deck amidships. Comes in lengths up to 18 ft.



Outboard Cruisers range to 20 ft. and take one or two 25-hp. motors. Remote controls should be used





Here's a man boarding a boat properly. Notice how he's carefully stepping on the seat—not the gunwale. It's easier and safer to do it the right way

motor that are balanced or, if you already have a motor, be sure that the hull obtained is suitable for the motor. A motor that's too small for the hull won't give the efficiency you want, while a motor that is too large will eventually damage the boat as well as create tricky handling qualities that might prove dangerous. Four basic hull designs are shown on page 166. These are available in a wide range of sizes, design, and quality and can be purchased complete or in kit form.



Reluctant little girl on dock knows that she can't swim. The boat shouldn't carry more than four persons, so a load like this almost guarantees swamping

What if the motor conks out? As dependable as these things are, there's always the possibility that something might go wrong. So, carry along a paddle or a pair of oars—just in case. Emergency repairs to the outboard usually aren't difficult and, if a few tools and spare parts are carried along in the boat, you probably can have her running like new in a few minutes. Take along an extra set of spark plugs, a couple of shear pins and possibly a spare starter cord. A



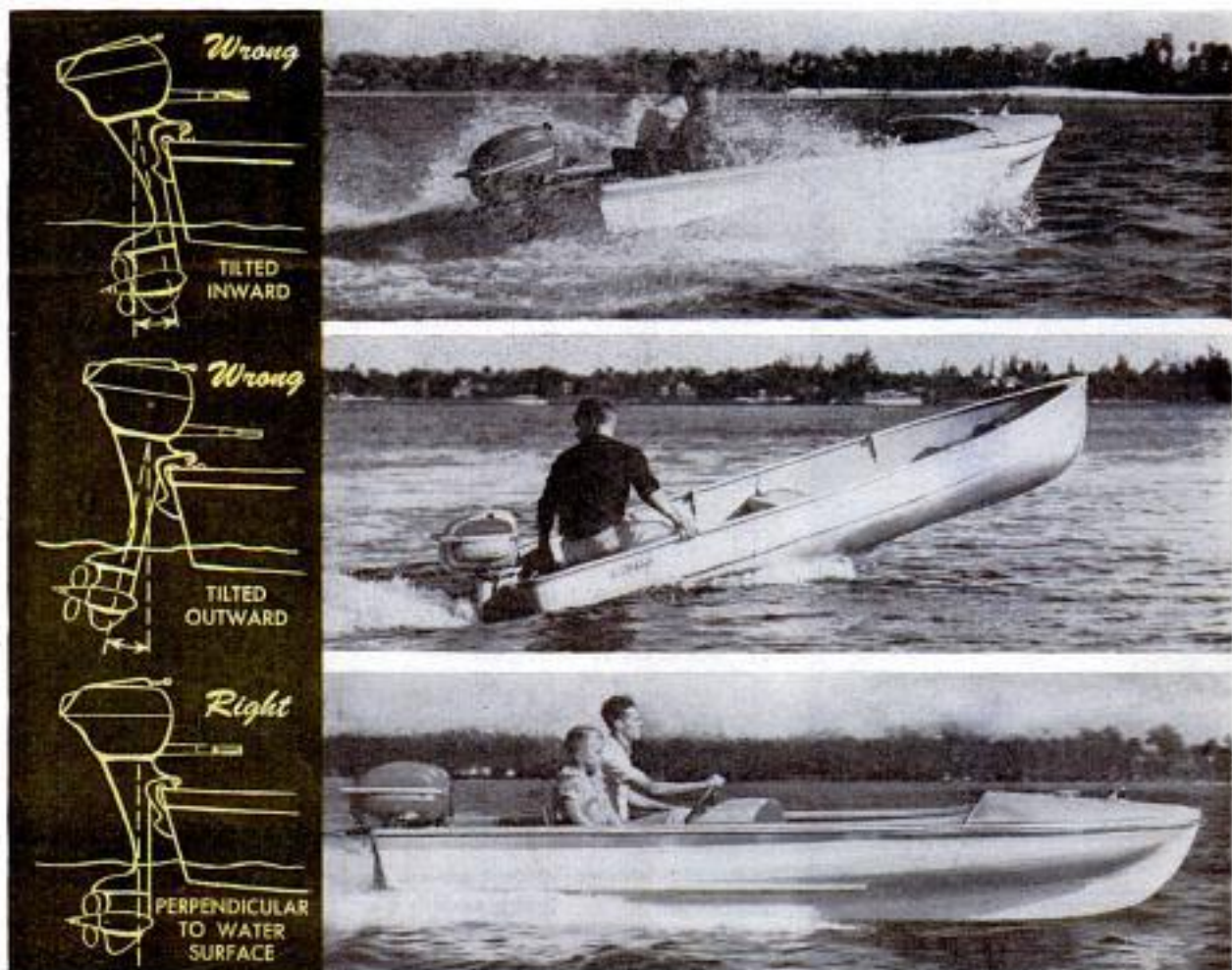
Joyriders cutting across bow of another craft just made it this time, but odds are all against them

the seating comfort of the passengers, and acting as life preservers.

When boarding the boat from a dock, step gently into the center of the boat, crouching low and grasping the gunwale. Either load the motor and gear into the boat before stepping aboard or set them on the dock within easy reach. Then, board the boat and retrieve the gear and motor from

the dock. Naturally, if there is someone to help load the boat, the job is simplified considerably. After slipping the motor bracket over the center of the transom, tighten the clamp screws by hand. Then connect a safety chain or rope to the motor. The safety chain is secured to the boat so that the motor will not be lost if it should work loose from the transom.

Note how wrong motor tilt affects the performance of boat. Motor in lower photo is tilted correctly



Unless the motor already is adjusted for the boat, you will want to check the motor tilt. The photos at the bottom of the opposite page show how a motor tilted either inward or outward will cause the bow to dig into the water or ride too high. Adjust the tilt bracket so the drive shaft is perpendicular to the water when running.

Loading the boat (that is, the number and location of the passengers) is extremely important to safety and the handling of the boat. Even though there is seating room, the smaller boats (12-ft. class) are not designed to carry more than three or four persons—no more than three if the water is choppy. Unless the boat is one of the larger family-type craft, don't expect to carry more than three passengers and yourself with safety. For the best handling characteristics and maximum speed, in addition to safety, it is important to distribute the load evenly over the length of the boat. The motor, of course, is on the stern and, unless you have remote controls, you'll be back there with it. So seat extra passengers and stow gear toward the bow, balancing the boat to keep the bow down on the water.

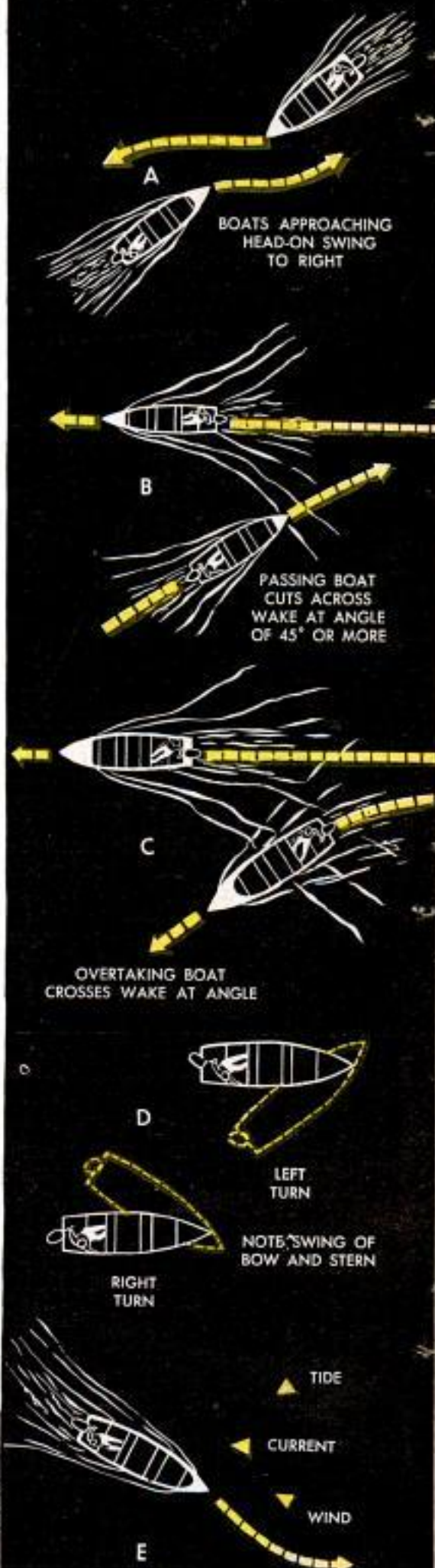
If the boat is beached or docked in shallow water, push off into deeper water before starting the motor—here's where the paddle will come in handy. When starting the motor, keep your eyes forward and a hand on the throttle. Take it slow and easy as you pull away from the dock—watching for boats that might approach from the other side of the dock—and be sure the boat will clear the dock before you turn. Note detail D at the right.

When operating a boat you have certain "rights," certain legal responsibilities and certain procedures to follow that are a matter of safety, courtesy and common sense. For example, remember that boats without motors have the right of way over outboards and that you are legally responsible for your wake.

When approaching another boat head-on, both boats should veer to the right and then straighten out on course, detail A. Cut across the wake at an angle, B, so there'll be no chance of being swamped. When overtaking another boat, the one being overtaken has the right of way. As you cross the wake, again cut through the waves at an angle, detail C. Docking takes practice but is not difficult, especially with a gear-shift motor. Come in toward the dock slowly against the wind, tide or current, whichever may be the strongest, detail E. Just before reaching the dock, cut off the power or shift into reverse.

Becoming a top-notch skipper requires experience, but you'll be welcomed immediately into the boating fraternity if you start out by using good judgment and courtesy. Next month, part II of this article will tell how to care for and maintain an outboard motor. ★ ★ ★

This is as silly as it is dangerous. Might look fast, but having bow high in air slows down boat, obstructs vision and makes craft hard to handle





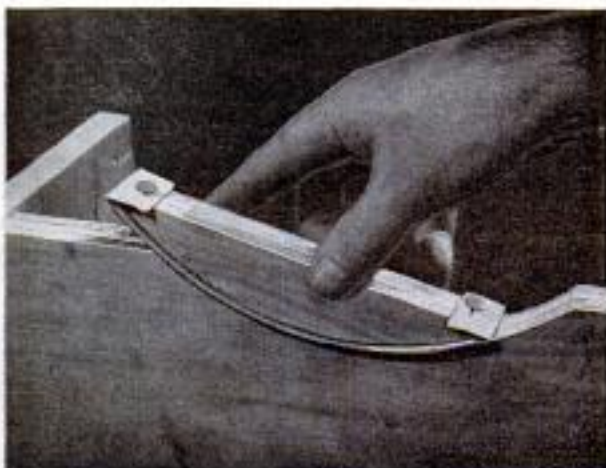
Forms for Concrete "Stones" Are Discarded Cooking Pots

Concrete "stones," which will provide protection for the lawn bordering a driveway, are easily cast by using discarded aluminum cooking pots as forms. First, hammer the bottom and sides of each pot to make it an irregular shape. Then fill pots with concrete and force a bolt or length of steel rod into the middle of the form, allowing about 4 in. to project. After the concrete has set, a few light taps on the form will cause the stone to drop out. When the stones are set along a driveway, the projecting rods or bolts are forced into the ground to anchor the stones in place.

Walter J. Swontek, Dania, Fla.

Waste Piece From Curved Cut Used as Sanding Block

After cutting a curved section from work in your shop, cover the waste portion with a strip of sandpaper and use it as a sanding block. This will result in a perfect sanding job without any danger of altering the contour of the edge to be sanded.



CANE-WOVEN HOT PAD

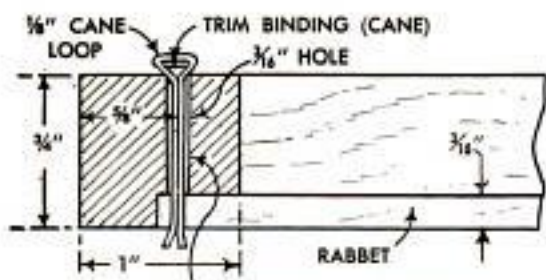
By Walter E. Burton

Offering something different in the way of a hot-dish pad, this cane-woven one will appeal to those with a flair for the unusual. It's the type of project the enterprising home craftsman will want to add to his line of gift-shop items. To help save weaving time, cane webbing which comes already woven, can be used instead of strand cane. In this case, a $\frac{3}{16}$ -in. groove is used to take a reed spline which is glued in place to anchor the webbing.

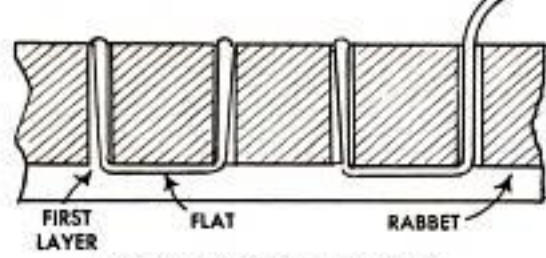
The wooden frame measures 8 in. square and is assembled from $\frac{3}{4}$ x 1-in. maple. Dowel or mortise the corners of the frame and cut a $\frac{3}{16}$ x $\frac{1}{2}$ -in. rabbet on the underside as indicated in the detail. Following the photos, drill a row of nine holes along each frame member, spacing them $\frac{3}{4}$ in. apart. You'll note that there is an additional hole at each corner, making a total of 40 holes. Finally, sand the frame, rounding the edges and corners slightly, and finish with clear lacquer.

A study of the photos on the opposite page will give you a good idea of how the weaving is done. Use regular chair-seat cane about $\frac{1}{8}$ in. wide and soak it in water for about 15 min. to make it pliable. The rabbet on the underside of the frame provides clearance for the strands. The starting and supplemental strands are anchored to the frame by knotting the ends of the cane and driving a small nail or tack through the knot. Begin weaving from left to right, using a wooden peg to keep the strand taut as the weaving progresses. Weave back and forth and, when the horizontal strands are in place, lace the vertical ones. Two layers of horizontal and vertical strands are required, and actual weaving begins with the second layer of vertical strands, weaving over and under and drawing snug. The pattern is completed by lacing diagonally, under the horizontal strands and over the vertical ones. This is done in one direction and then the other. Tension on the woven cane is relieved by re-moistening occasionally with a wet cloth. The final weaving step consists of covering the holes with a strand which is held with running loops of cane passing through the holes as shown in the detail. The end of the strand is anchored with a tack as before. Rubber-headed tacks at the corners of the frame provide nonmarring feet.

WTM '55



HOW HOLES ARE TRIMMED WITH CANE



POSITION OF CANE IN HOLES



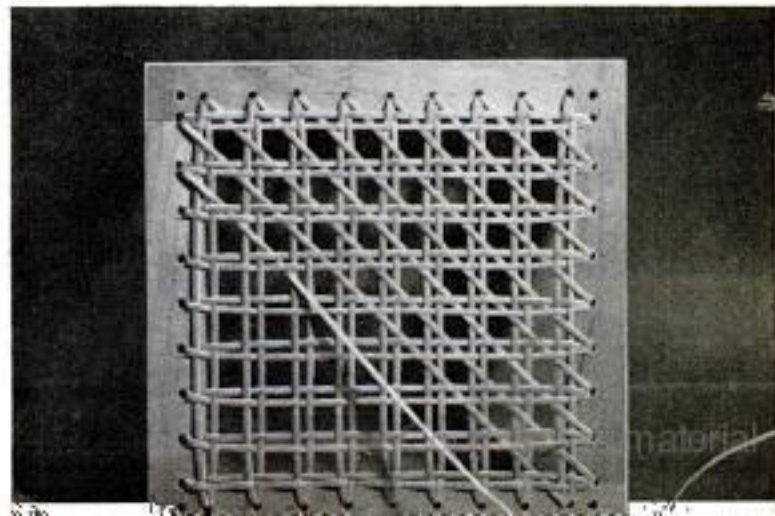
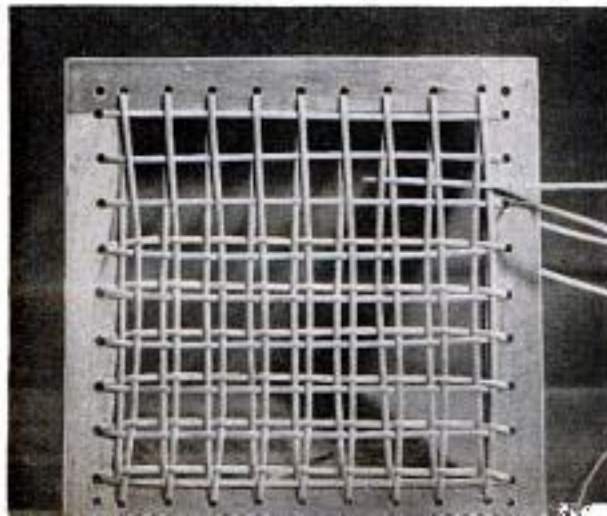
Below, router bit in drill press is quick way to run 3/16 x 1/2-in. cane rabbet around inner edge of frame on underside. Although it is optional, rabbet conceals anchored ends of strands to make neat job

Below, after first soaking cane in water for 15 min. to make it pliable, run two layers of strands, one on top of the other. Add third layer and start weaving with fourth layer, over and under the first and third



Below, fourth step is nearly completed. Watch to see that the glazed side of the cane is always up and keep work dampened with wet cloth to make weaving easier. Use wooden peg to keep strand from slipping

Below, fifth step consists of weaving diagonally across the frame, under two and over two. When this step is completed in one direction, it is repeated in the opposite direction, over two and under two as shown

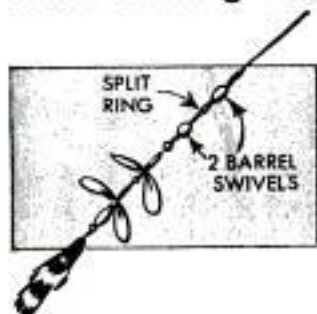




Die Made of Steel-Rule Stock Cuts Accurate Duplicates

When he had a number of accurate duplicate cuts to make in cardboard, leather, and other sheet material, one man made a die using steel-rule stock obtainable at most printers' supply houses. The steel-rule strip was cut into four equal lengths and the rough opening for the die was cut in a piece of plywood of a thickness slightly greater than half the width of the rule. The opening in the plywood was filed until the steel-rule strips fitted snugly into it, thus forming the square die. The waste piece which had been cut from the opening was then forced back in place to lock the steel-rule strips in position, and the entire assembly was backed with $\frac{1}{4}$ -in. hard-board. The material to be cut was backed with cardboard to protect the cutting edges of the die. The rule edges of the die can be removed for resharpening. In use, the two assemblies are squeezed together in a vise, or the cutter is forced into the material by hammering on it with a mallet.—Walter E. Burton, Akron, Ohio.

Prevent Spinning Lures From Kinking Fishline



freely, the two swivels will allow the lure to spin without kinking the line.

To prevent a lure or spoon with a spinning action from twisting and kinking your fishline, attach the lure to your line as shown, using two barrel swivels connected by a split ring. By turning

Plastic Bottle Used to Spray Water on Dirty Windshield

An empty plastic deodorant bottle filled with water can be kept in the glove compartment of your car for use in cleaning the windshield. A few squeezes of the bottle puts a film of water on the windshield and the dirt can be wiped off easily. To improve the cleaning qualities, window-spray solution can be put into the bottle in place of water.

Warren Manske, Milwaukee, Wis.

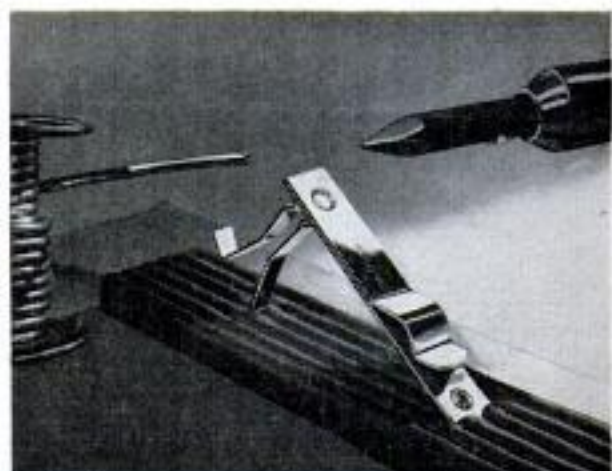
Papers Held by Envelope Flap When Stapling Several Sheets

When very frequently faced with the slow job of stapling together the sheets of a large number of pamphlets and circulars, one office worker used the flap of an envelope to help maintain accurate alignment of the sheets and speed up the job. He squared up the sheets and inserted them under the loose flap of a common envelope which held them evenly while stapling together.



Small Objects "Clamped" in Clay While Soldering Joints

Small, irregularly shaped objects to be soldered can be "clamped" in a block of child's modeling clay. The clay may be shaped firmly around the objects to be held, does not conduct away the heat and is heavy enough so that it will not shift when the soldering iron is applied. Do not allow hot iron to contact clay.



LUNCH BOX

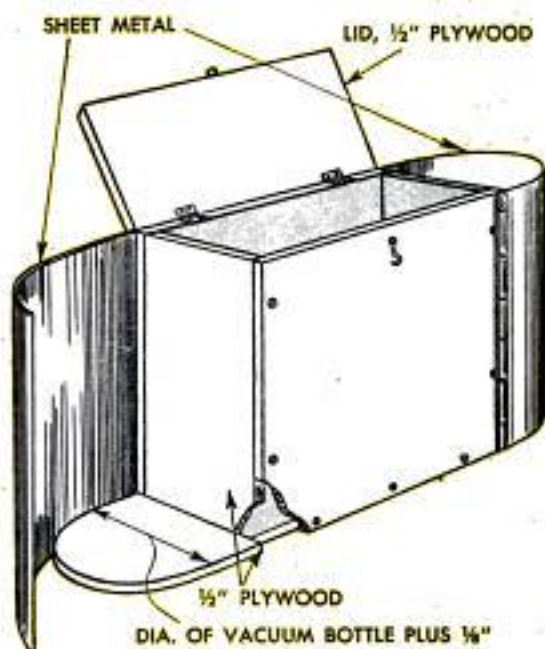
Hooks Over Car Seat

The sometimes messy job of serving a light lunch while traveling in a car is simplified with this lunch box, which hooks over the back of the front seat. If you have small children, the box will be especially convenient. Pockets at each end hold vacuum bottles, and a roomy compartment in the center stores sandwiches and other foods. The handles swing outward to double as seat hooks. The center section is a simple plywood box, measuring 9 in. long, 8 in. high and fitted with a hinged lid. The depth is determined by the diameter of the vacuum bottles. Pockets for them are formed by bending sheet metal over the rounded endpieces and tacking to the center compartment. Then the entire unit is covered with heavy oilcloth. The handles are bent from curtain rods.

Bertram Brownold, Cedarhurst, N. Y.



Curtain-rod handles swing out to form hooks for hanging lunch box conveniently over back of car seat



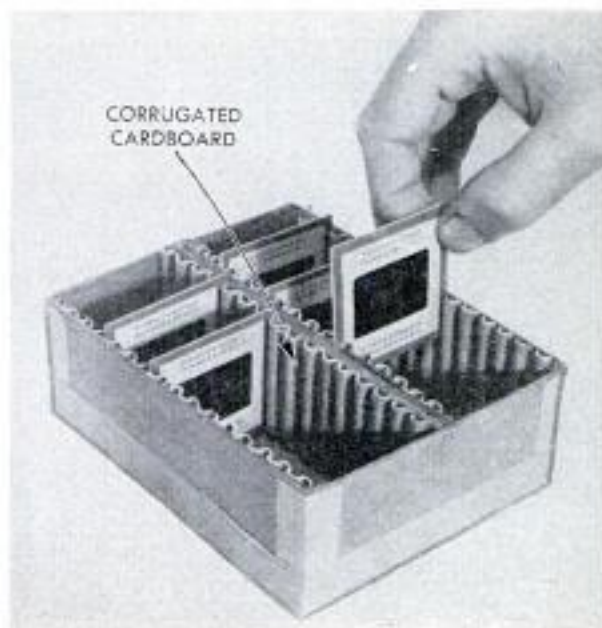
File for 35-mm. Transparencies Made From Photo-Paper Carton

This handy file for 35-mm. transparencies can be made by gluing strips of corrugated cardboard in the center and to the sides of a box of the type used as a container for 100 sheets of 4 x 5 photographic print paper. The center strip is $\frac{3}{16}$ -in. cardboard with corrugated board glued to both sides, and is glued to bottom and sides of the box. If two transparencies are placed in a slot, the file will hold 60 mounted slides.

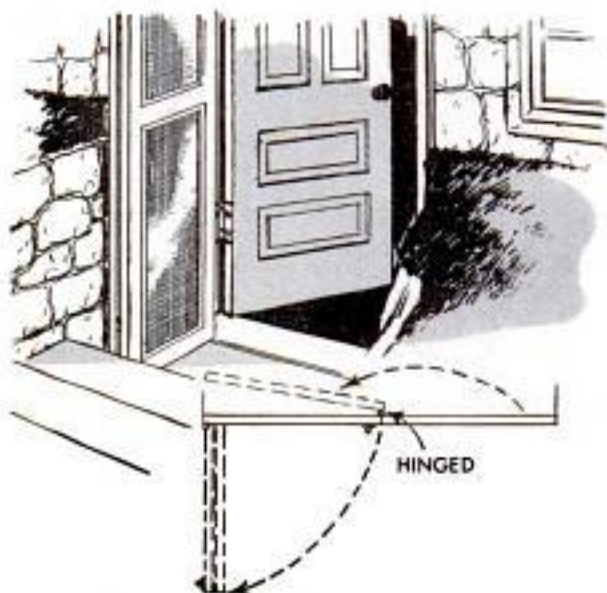
Weighted Drapes Hang Straight

New or newly washed curtains and drapes can be made to hang properly if small weights, such as stones, are inserted in the hem and distributed where needed. After several weeks, weights may be removed and drapes will hang straight of their own accord.

E. V. Marchbank, Canton, Ohio.



Solving Home Problems



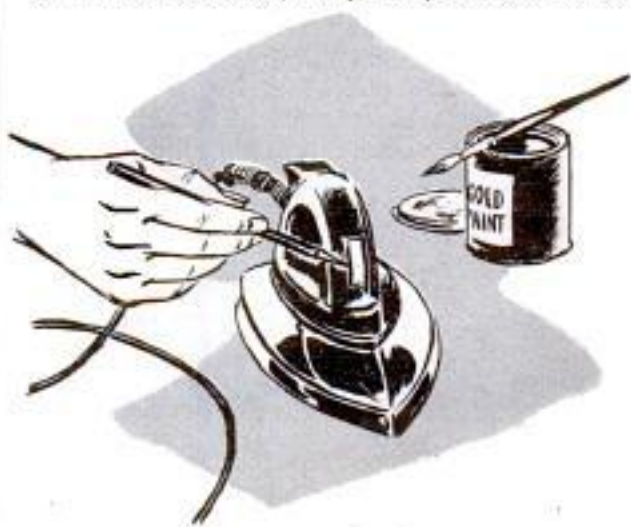
A SCREEN DOOR for the basement might be impossible because of lack of room for the door to swing unless you do as one reader did: make the door in two sections and hinge it together, so it folds to one side

INSTEAD OF DISCARDING that last bit of stick cologne when it becomes too small to handle, just wrap it in a facial tissue and carry it in a corner of your purse as a gentle but long-lasting perfume. It also may be placed in a jewelry or hosiery box



BARE WALLS in a kitchen can be relieved with a dummy window made by putting a mirror into a large picture frame, attaching a board as a sill and hanging curtains to complete the illusion

THE LETTERING on the thermostat adjustment of an electric iron can be renewed when it becomes worn and faded. Increase depth of letters with a heavy needle or awl, then fill with "gold" paint mixed to a thick consistency. Wipe surplus from surface





FOR CLEANING narrow-neck vases, deep bottles, inaccessible corners and other out-of-the-way places, fasten a piece of sponge to the end of a small stick or dowel of suitable length. Dipped in a detergent solution, this gadget will enable you to do the cleaning job with ease

MENDING TAPE, which is applied with a hot iron, can be cut into the shape of initials to be applied to clothing for identification purposes. The letters can be traced on the tape from magazines or newspapers, using carbon paper, and then cut out



BATHROOM MIRRORS which are subjected to an unusual amount of dampness will remain clear and unclouded much longer if a coat of clear shellac is brushed over their back surfaces. This will serve to seal out the moisture. A plastic spray also can be used



DECALS won't be hard to remove from furniture that is to be repainted if the surface is waxed before the decal is applied. Then a few wipes with a cloth dipped in hot water or gasoline removes decal easily

PAINT COLOR SAMPLES are easier to carry in your purse or pocket, to mail to a color consultant and handier to use if they are made by dabbing the paint on a scrap of cellophane taken from a cigarette pack. This type of sample makes comparisons easy



Projecting Doorknobs Replaced By Recessed Cabinet Pull



Replacing the knob on a door which is in a hall or other cramped space, with a recessed-type cabinet pull will remove the hazard of snagged coat sleeves and lost tempers. Remove the regular knob and lock and plug the holes. Using an expansive bit, drill a hole in the door to receive the metal backing plate of the cabinet pull, allowing the point of the bit to just show through the other side. Glue a wood block, larger than the hole, to the inside of the door, and drill a hole in it for the screw that holds the cabinet pull. Because the latch is removed, it is suggested that a heavy friction-type catch be used. This idea is most practical for closet doors.

Tom Riley, Portland, Ore.

Paper-and-Paraffin Starters Ideal for Outdoor Fire Use

PAPER ROLLED AND SOAKED IN PARAFFIN

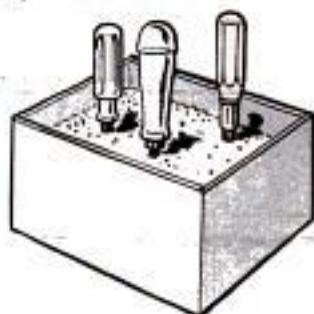


A couple of these paper-and-paraffin fire starters, which are small enough to be carried in your pocket, pack or fishing box, will simplify starting campfires. Tightly roll a 2-in.-wide piece of absorbent paper, such as newsprint, into a roll about the diameter of a broomstick. Melt ordinary paraffin in a pan and drop the roll into it. When the roll is well soaked with paraffin, remove and let dry. To start a campfire, drop the

fire starter on a few sticks or pieces of bark, light it with a match and your fire is well on its way.—Russ Jenkins, Chicago.

Oil-Soaked Sand Keeps Tools Rust-Free in Damp Location

Tools kept in basements, garages, tool sheds and other locations where dampness is prevalent can be safeguarded from rust by storing them in a box of oil-soaked sand. Use a box large enough to accommodate the number of tools to be stored, fill it with clean sand and saturate the sand with motor oil. Tools are stored by inserting them with the handles exposed.



Henry A. Miller, Kent, England.

Patching Torn Window Screens

Neat emergency patches may easily be made in window screens if the hole is covered with mosquito netting, and then two or more coats of shellac are applied over it to cement it to the wire. When dry, the patch will effectively keep out all insects and save you the bother of replacing the screen wire until the screens are taken down in the fall.

Cutter and Ratchet Screwdriver Is Substitute Hand Grinder

When a power tool is not at hand for cutting and grinding, a slow but satisfactory job can be done by mounting wheels or cutters of the power type in the chuck of a ratchet spiral screwdriver. A downward thrust on the handle will revolve the cutter rapidly. Only light pressure should be used so that the cutter can be held in position without slipping.



THE HANG OF WALLPAPERING

Hanging wallpaper is easy when you know how, and new papers and pastes have made it easier

By Tom Riley

IF YOU want to give your living room a brand new mood, or provide a real lift to a tired dining room or bedroom, there's wonderful help waiting for you in the nearest wallpaper pattern book. You'll be pleasantly surprised at the grand selection being shown in wallpaper stores these days—in almost any color or pattern you can imagine, from the very traditional to the ultramodern, for every room in the house. And, what is more important, the art of wallpapering has been brought into the "do-it-yourself" field with the introduction of new papers and pastes, and new methods. Much of the muss and fuss of papering has been eliminated so that a good job can be done by almost anyone.

Selecting the paper: The heavier rough papers are an especially



One innovation in the wallpaper field which simplifies paper hanging for the homeowner is a new paste-impregnated paper that is electronically pretrimmed. The only tools required to hang this paper are a sponge, scissors, yardstick and plumb bob





Pictures at left show two methods of trimming wallpaper prior to applying paste. Careful cutting with scissors is satisfactory, though the use of a straightedge and roller will give a better edge. If using cutting table, apply paste before trimming



Above, curl is taken out of paper by drawing it, print side up, over the edge of a table. At left, paste is applied to top half and paper is folded to center. Then the bottom half is pasted and folded. Folding keeps the paste moist



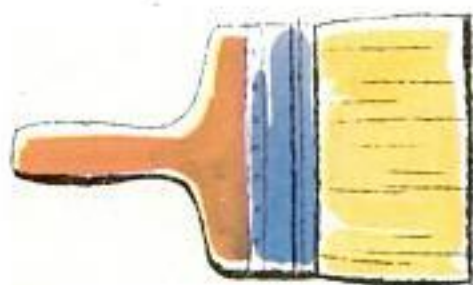
good bet for the amateur. They are easier to join, tear the least when handled and cover rough plaster, plywood and old wallpaper without blemishes. The standard wallpapers vary considerably in price. When choosing one, select only high-grade paper. Economy at this point may prove expensive in the long run. Also available are washable types of standard paper, which are easy to keep clean and new looking. Fabric wallpapers, consisting of a decorative cloth or grass mat glued to a paper backing, are popular today but are quite expensive. You can economize here by using imitation "grass cloths," which are heavy standard papers that are difficult to tell from the fabric type. Cellulose-plastic papers are among the newest additions to wall-papering. Though they have the appearance of standard papers, they can be scrubbed the same as an enameled wall. Standard wallpaper, too, can be made fully washable by an application of one of the new plastic "lacquers," which are brushed on the paper after it is hung.

Ready-pasted and trimmed papers: Designed especially for the homeowner to apply himself, papers with the adhesive already on the back and pre-





Seams are rolled after the paste has set. Usually by the time 4 or 5 lengths have been hung the paste will have set properly for rolling. Keep the seam roller wiped clean to prevent paste stains on paper



Roller cutter is used to trim paper along moldings and baseboard after paper is smoothed on with brush. Edges around door and window frames also are trimmed with roller cutter. Waste should be kept away from paper on the wall



trimmed by electronically-guided machine cutters have made their appearance. The newest of these papers is "Quick," manufactured by the Birge Co. of Buffalo, N. Y. The paper is washable, has the adhesive impregnated right in it and comes rolled with the pattern on the outside. To apply this paper, the wall is prepared by dusting and removing any loose ends of the old paper. Then, for a smoother job, the old seams are sanded flush. If the paper is to be put on a new wall, or a wall which is painted with a high-gloss enamel, a glue sizing should be put on the wall first. Even on walls which are covered with flat and rubber-base paints, it is always best to size before applying paper. In addition to the paper, which comes in standard-sized rolls, you need only a pair of scissors, a cellulose sponge and a yardstick. With every roomlot of the paper, a cardboard trough is provided to hold the water used in wetting the adhesive.

The trough, half-filled with water, is placed on the floor along the baseboard. The first strip of dry paper is cut to length, then allowed to roll naturally. Immerse the roll in the water for 30 sec., then grasp the top end of the strip and pull it out so that the roll remains submerged to permit all of the adhesive to be wet. If necessary for convenient handling, fold the adhesive-coated back against itself, just as in conventional paper hanging. Apply the adhesive side to the wall in much the same way as you would stick a postage stamp to an envelope. Since the adhesive remains wet

and workable for better than 15 min., there is no need to hurry. Slide the strip into proper position in respect to a plumbed guide line. Use the sponge with only normal pressure to smooth the material and force out the air bubbles. Only the large bubbles need concern you. The small ones which the sponge won't move will disappear as the paper dries. The paper is pre-trimmed, so neat butt seams are easy to make. Where complicated seams must be made, simply overlap the two thicknesses, cut them as required, remove the scrap and press the remaining material into place. The adhesive is nonstaining and can be wiped off the surface of the paper with a sponge or cloth at any time. If the entire room cannot be finished at one time, the job can be done piecemeal.

Tools: For standard wallpaper application, complete kits can be rented in many parts of the country at nominal cost from wallpaper dealers. Such a full set of tools includes a seam roller, shears, yardstick, paste brush, smoother brush, trimming knife, scraper, 7-ft. straightedge and a cutting table. For a small papering job, you can probably find enough tools around the house to do an adequate job. For the seam roller, substitute a clean wooden-wheeled furniture caster. Any household scissors



Left, new type of paste now on market is applied to wall instead of paper. Paper is unrolled on wall, eliminating cutting



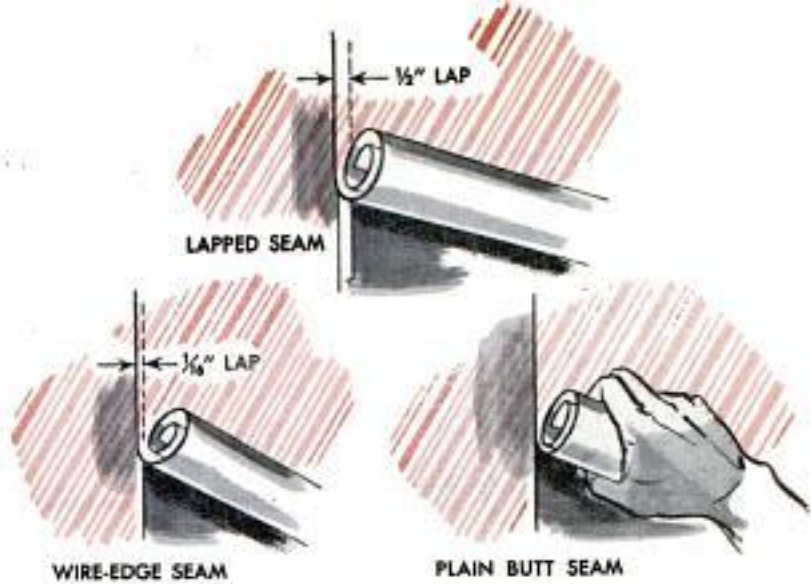
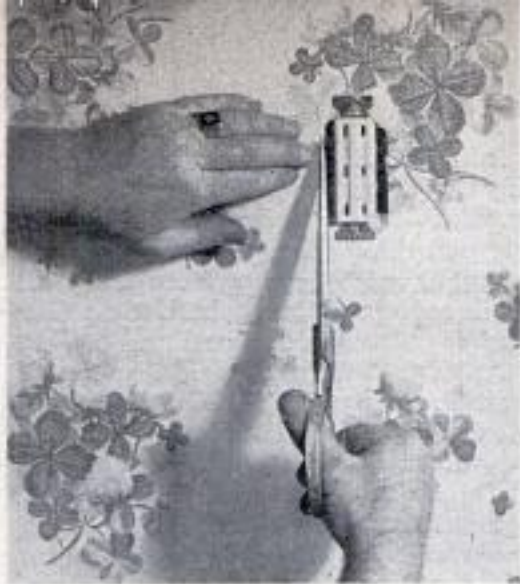
Photo courtesy Wm. Barr and Co.



Garden sprayer can be used to apply water or wallpaper-removing solution when taking off old paper. Secret of easy removal is thorough soaking of wall before scraping

will do for the shears, and the paste brush can be any large brush on hand. For the smoother, use a soft sponge. A good sharp knife or razor blade will serve as a cutter, and a trued-up 7-ft. board can be used as the straightedge. You will also need a plumb bob to start the job and some type of worktable on which to do the cutting.

Wall preparation: Getting ready is half the battle. If the old wallpaper is well bonded to the wall, there is no need to remove it. Simply smooth any lapped joints with sandpaper and start the new paper so that the new joints will not fall directly over the old. Do not size the old paper. If there is any indication of a poor wall bond, completely remove the old paper. The common way to do this is to soak the paper, using a large brush or a paint roller dipped in hot water. The spray attachment on your vacuum cleaner can be used to wet the old paper. Go entirely around the room, wetting the paper thoroughly. When the last wall is soaked, the first paper should be loose enough to remove with the scraper. Adding a little baking soda, borax or ammonia to the water will aid in softening the paste. Or better yet, use one of the new wallpaper-removing solutions now available at your paint dealer. In some localities, equipment for steaming off the paper can be rented. When all of the paper has been removed, wash down the walls with a sponge and let dry. Holes and cracks in the plaster



Paper is pasted directly over switches and wall outlets after cover plates are removed. When paper is completely dry, it is trimmed away with scissors

The lapped seam is the easiest to make since only one edge need be trimmed. Wire-edge seam looks better but is harder to match. Butt seam is smoothest

are filled smoothly with patching plaster. Very porous plaster, new plaster, plaster-board and plywood walls should be glue-sized. The size is mixed with hot water and applied while still warm, using a large brush to apply it quickly before it jells. Let the size dry thoroughly before papering, or it may stain through. Walls which have been painted should be washed before sizing, and calcimine or whitewash should be thoroughly removed with hot water. On rough walls, such as sand-plaster finishes, apply a lining paper or lining felt first. The liner also should be used on plywood to hide the grain if a thin paper is to be used. Wallpaper may serve as a liner if the pattern side is placed against the wall.

to the first and put on in the same manner.

Estimating rolls: Because some rolls of paper vary in size, it is best to have your wallpaper dealer figure the number of rolls needed. Give him the length, width and height of the room, plus the number of doors and windows. Or you can estimate the number of single rolls (the standard 8-yd. roll) by using the table on this page. Subtract one roll of paper for each two doors and window openings.

Cutting to length: Before cutting the paper, see that all rolls are from the same factory "run" number, for the best match. Examine the pattern closely so you can cut it without waste. Usually there will be "join" marks on the edges of untrimmed papers. There are two types of wallpaper patterns, the straight and the drop. With the straight pattern, all lengths of paper are cut on the marks to match. With drop patterns, the strips will match only if you drop each successive strip half the pattern design. Thus, if the pattern repeats itself every 18 in., the next length of paper must be lowered 9 in. to match. In using a drop pattern, cut from two rolls for economy, one on the marks and one halfway between the marks. Before cutting regular paper, take the curl out of it by sliding it, print side up, over the edge of a table.

Paste: Regular wallpaper paste can be purchased ready-mixed, requiring only the addition of water according to the directions. Use a small paddle to mix the paste. For lightweight papers, make the paste thin, while for heavy papers, keep it quite stiff. The new plasticized pastes, which come ready to use, are a boon to the beginner because they smooth out well and will not stain the paper. The latest innovation in pastes is one which is applied to the wall instead of to the paper. Made by Easy Hang Adhesives, Inc., of Aurora, Ill., this new paste eliminates precutting of the paper. After the paste is applied to the wall, the end of the paper is pressed in place at the top of the wall, allowed to unroll to the bottom, and cut off at the baseboard after brushing down. The next strip is matched

Pasting and trimming: If you trim the edges with scissors, do it before pasting, using a yardstick to draw a light trim line. If trimming with a knife and straightedge or on a cutting table, trim after pasting, so as not to get paste over the finish edges. The trimming also depends on the type of joint you use—lap, wire or butt. The lapped joint is the simplest and requires trimming

ROLLS OF PAPER FOR ROOMS

Lineal ft. of walls	Height of room				Rolls for ceiling
	8'	9'	10'	11'	
48	12	13	15	16	2
52	13	15	16	18	3
56	14	16	17	19	3
60	15	17	19	20	3
64	16	18	20	22	3
68	17	19	21	23	3
72	18	20	22	24	4
76	19	21	23	26	4
80	20	22	25	27	4
84	21	23	26	28	4
88	22	24	27	30	4
92	23	26	28	31	8
96	24	27	30	32	10
100	25	28	31	34	13
104	26	29	32	35	14

Single rolls



When papering ceiling, the paper is carried loosely folded back and forth across a stick or odd roll of paper. It unfolds easily as you cross the room

only one edge. For the wire joint, both edges are trimmed, but do not need to be perfectly true because they lap about $\frac{1}{8}$ in., leaving less bulge than the lapped joint. The butt joint is the very best but requires perfectly true edges to butt together snugly. The ready-trimmed paper makes excellent butt joints.

To apply paste, lay a cut length of paper upside down on the table and spread the paste evenly on the upper half. Then, without creasing, fold the end of the pasted half to the center. Paste the other half and repeat the fold to the center. This keeps the paste clean and prevents drying out. If the edges are to be trimmed, keep the selvage perfectly even when folding. Lay the straightedge on the folded paper and trim. Work fast with thin papers or the paper will become too wet and may tear. Avoid pasting or hanging in a drafty room because fast drying may crack the paper. Don't let paste dry on the table—wipe it off after each day's use.

Hanging the paper: The trick of papering is to hang the first length plumb. Start on the obscure side of a door or window, because the last length is difficult to match exactly against the first. If the door or window is not plumb, run a plumb line from the top of the wall one length of paper away from the frame. Hang the first length to this line, trimming to fit the frame. When hanging paper, carry the pasted lengths folded to the wall. Unfold the top half by lifting the top high and letting it unfold slowly of its own weight. Press the top corners in place with your fingers, leaving an inch or so of paper above any top mold-

ing. Smooth out the paper with the brush, crowding the upper end tight against the molding. Unfold the bottom half and repeat the smoothing. If a wrinkle appears, pull the paper gently away from the wall and smooth back in place again. Use a roller cutter to trim at the baseboard and ceiling molding. Before the paste dries, wipe off any excess on the woodwork. Cut the paper $\frac{1}{2}$ in. wider than needed around doors and windows and crowd into place against the wood, then trim with the roller cutter. For corners, measure from the last length hung to the corner, and cut a strip $\frac{1}{2}$ in. wider than this measurement. Hang this strip, crowding the extra $\frac{1}{2}$ in. around the corner with the smoother. Then hang the remaining part of the cut length as the first length on the adjoining wall, using a butt joint, thus matching the pattern. Use a chalked plumb line again to hang this first strip on the next wall. Always have clean damp cloths available to remove any paste marks on the paper. Roll down the seams of the paper after 4 or 5 strips have been hung. Keep the seam roller wiped clean. At electric outlets and switches, remove the cover plates and paper over the openings. Then trim with a scissors when fully dry. The border at the ceiling is hung last, starting in an obscure corner.

Ceilings: Ceilings today are often painted, but can be attractively papered with less difficulty than you might imagine. As with the wall, the secret of overhead paper hanging is in starting out correctly. A ceiling is always hung before the walls, and is started by snapping a chalk line about 16 in. out from the wall and hanging to this line, carrying the paper down the wall about $\frac{1}{2}$ in. Using butt joints, the paper can go either across the room (shorter and simpler) or lengthwise (fewer seams). But with lap or wire joints, it is important to start along the lighted side of the room so that shadows will not be cast from the seams, making them noticeable. Carry the paper to the ceiling folded loosely back and forth over a stick or odd roll of wallpaper. Press the end in place. Then, as you continue across the room, the paper will unfold as you smooth it in place. Ceiling seams are rolled down firmly, as on the walls.

★ ★ ★

Sharpen Scissors on Circular Saw

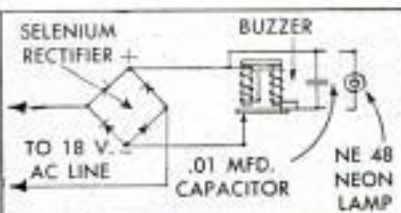
To grind scissors on a circular saw, place a grinding wheel or disk faced with emery paper on the arbor. Tilt the arbor or the saw table about 3 deg. and grind the scissors on the right side of the wheel. A piece of plywood can be clamped to the saw table to act as a guide.

Rodney E. Bellinger, Binghamton, N. Y.

W T M '55

Flashing Grade-Crossing Signals For Toy Trains

A grade-crossing warning buzzer and flashing red neon light will add much to the realism of any model railroad layout. As the train approaches the crossing, it operates a pressure switch under the track which starts the buzzer and light. Just like the real thing, the warning signals continue until the train has passed the crossing. Most model trains run from a transformer which supplies a.c. current, so it is necessary to wire a selenium rectifier into the circuit to change this to d.c. The rectifier used is a single-unit bridge type. The .01 mfd. capacitor has been found to be the most satisfactory. If the back electrode in the neon bulb lights, merely reverse the leads to cause the front electrode to glow. The bulb is a NE 48 neon



lamp. A buzzer is preferred to a bell because the louder sound of the latter will prove nerve-wracking in a short time.
George P. Pearce, Albuquerque, N. M.

Wagon-Wheel Lawn Bench Adds Beauty to Yard



The decorative value of old wagon wheels finds another application in this unusual lawn bench. The main frame of the bench is made from the front wheels and axle of a wagon. The uprights at the back of the seat and the angular braces extending to the ground are 2 x 4s, while the seat and back are 1-in. lumber. To prevent the uprights from sinking into soft ground, a 1/2 x 4-in. crosspiece can be nailed across the bottom between the uprights and the angular braces. To finish the bench, paint it white and trim such parts as the wheel rims, axle and hub bands in a dark color.
Kenneth Hadenfeldt, Storm Lake, Iowa.

Transfer Pictures Decorate Photograph

A novel way to decorate a photograph is to use colored transfer pictures, of the kind used for Easter-egg decoration. A sheet of such transfer pictures is usually included in a ten-cent package of Easter-egg dye and may be bought separately in small booklets at school-supply stores. The pictures are easily transferred to the photograph print by laying the transfer in place and dabbing the back with a damp cloth. The sheets of pictures include humorous drawings that will amuse adults, while others, including Mother-Goose and Walt-Disney-type sketches, will please children.

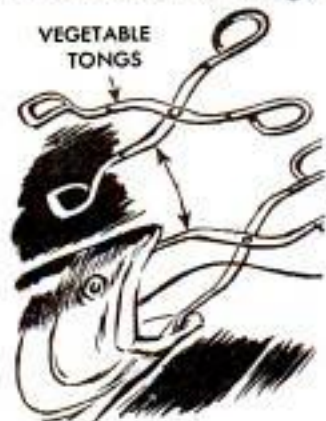


Screen-Wire Pad Removes Labels On Bottles and Jars



Difficult to do with the finer grades of steel wool used in scouring pads, labels can be removed quickly from bottles and jars with a piece of screen wire. The screen is shaped into a pad, with the ends of the wire folded under to prevent cutting the fingers. When the paper has been removed, regular scouring pads will remove any adhesive that may remain.

Hook Taken From Fish's Mouth With Aid of Vegetable Tongs



A pair of vegetable tongs, such as used by cooks for lifting hot vegetables from their cooking containers, can be used by fishermen as a handy disgorging tool when removing hooks from the mouths of fish. The closed tongs are forced into the fish's mouth and

then opened, thus forcing open the jaws. The hook then can be removed easily and without danger of being injured. The vegetable tongs can be purchased at most five-and-ten-cent stores.

Tracing Car Serial Number

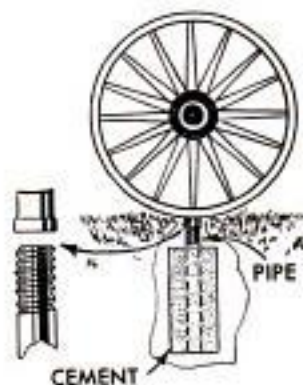
To make a tracing of a car's serial and engine numbers, which many states require when a title is being transferred from one owner to another, use a small piece of aluminum foil taken from a gum wrapper. The foil is placed over the numbers and

stretched tightly between the thumb and forefinger of one hand, while the thumb of the other hand is used to rub the area over the numbers until they become visible as impressions in the metal foil.

Mrs. J. A. Sweitzer, Armbrust, Pa.

Buggy Wheel Is Removable For Mowing Lawn

The difficulty of mowing around old wagon and buggy wheels, set permanently in a lawn, can be avoided by making the wheels removable. To do this, weld a 2-in. pipe coupling to the steel tire of the wheel. Set a length of 2-in. pipe in concrete, so that its top end is just below ground level. When the lawn is mowed, a few turns unscrews the wheel from the pipe base and the mower can run over the pipe without damage.

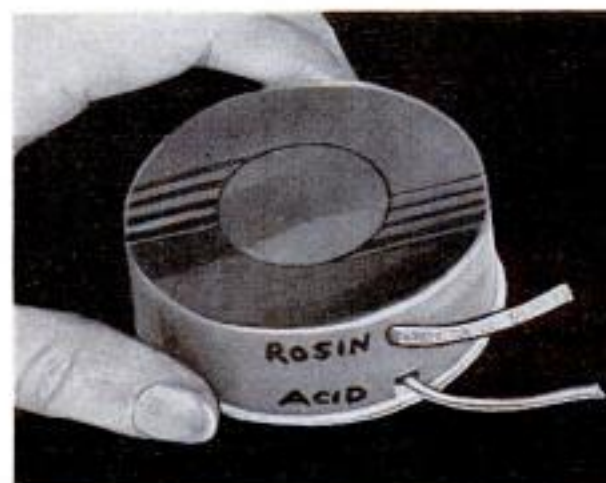


Orlin Jirka, Ralston, Neb.

Wire-Solder Dispenser

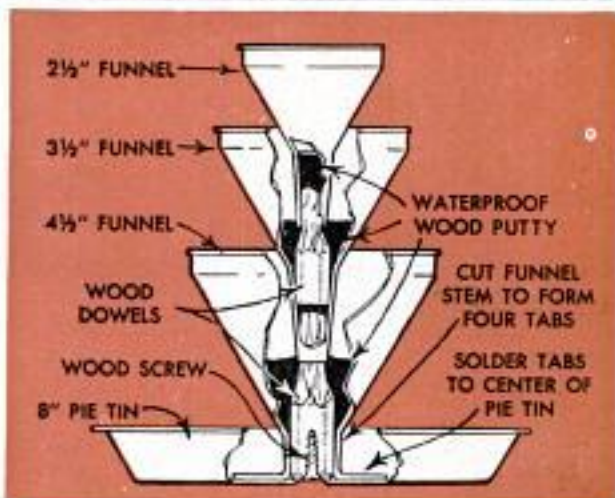
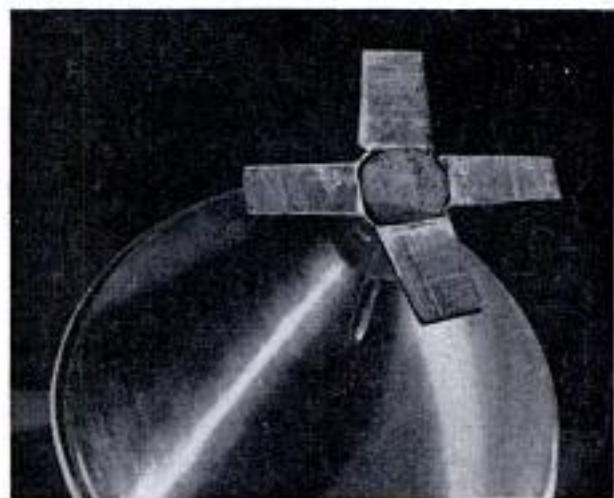
A discarded metal typewriter-ribbon box is used by one repairman as a compact container to carry a supply of both rosin and acid-core solder in his repair kit. Two $\frac{1}{8}$ in. holes are drilled through the sides of both cover and bottom. The hole in the bottom edge of the cover and in the top edge of the box are then slotted. One length of solder is coiled inside the box, the other in the cover, and the ends passed through the holes. The slots allow the cover and box to clear the projecting ends of the solder when the box is assembled. The type of solder is marked on the can.

John J. Rea, Urbana, Ill.



THREE-TIERED PLANT HOLDER

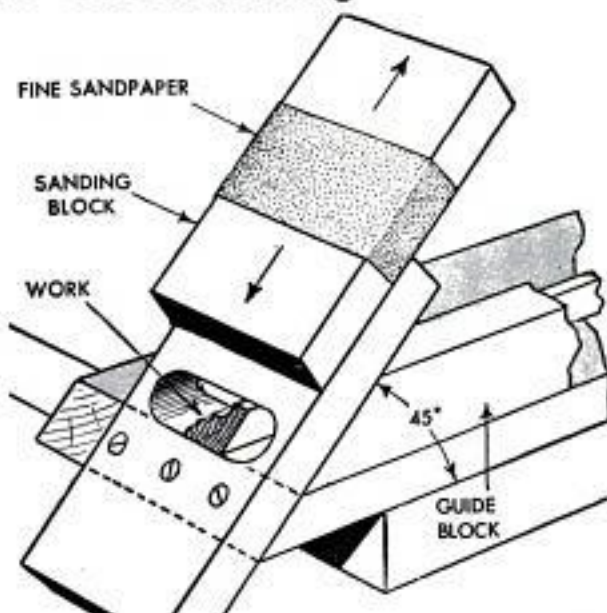
Three metal funnels of graduated diameters, a common pie pan, plus two dowel pegs, are all you need to make this attractive tiered planter. The cut-away detail shows how the pegs are used to hold the two top funnels vertically, while the photo below shows how the spout of the bottom funnel is slit and bent outward to form tabs for soldering to the pie pan. The whittled ends of the pegs are driven snugly into the funnel spouts, letting the one in the top funnel extend and cutting off the peg in the bottom funnel flush with the tabs. The peg in the top funnel is wedged in the second funnel and then waterproof wood putty is packed around the wooden pegs to seal spouts



Jig Assures Accurate Sanding of Miter Cuts on Molding

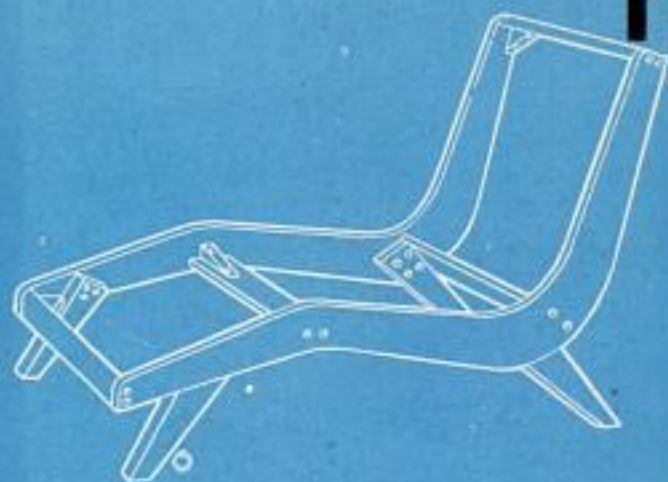
After sawing miters in picture-frame and other small molding, it is often necessary to sand the cut to make a good fit. This hardwood jig permits sanding perfect joints by rubbing a block wrapped with sandpaper over the mitered end of the molding which projects through an opening in the jig. The base of the jig is cut to 45 deg. on the end that joins the sanding face and the slot in the face is cut to the same angle. A guide block for the work is fastened to the base at right angles to the sanding face. The jig is assembled with glue and wood screws for rigidity. If the jig is used often, the sanding face should be covered with light sheet metal.

Donald Zuerl, Fulton, Mo.

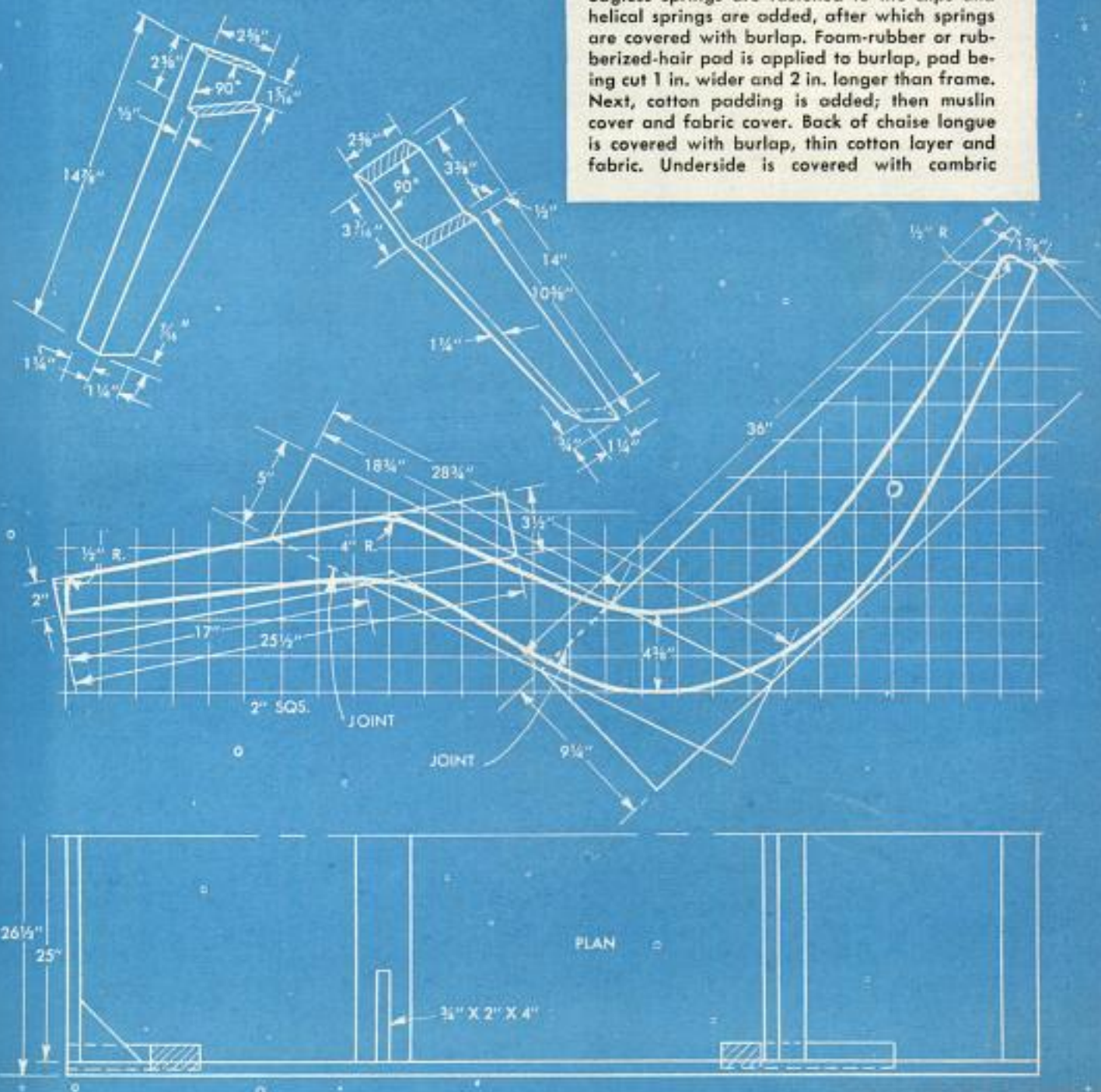


☛ To remove rust from cake tins, scour with a raw potato and powdered cleanser.

PLAN of the MONTH...



RELAXING CONTOUR design of this modern chaise longue will make it one of the most popular pieces of furniture in the house. Note from illustration that the four legs are the only exposed wooden parts of the frame and these should be of a hardwood such as oak, walnut or cherry. Frame is laid out full-size on heavy paper, using squared pattern below, and pieces for the side rails are half-lapped and glued. After side rails are band-sawed, frame is assembled with dowels or screws and glue. Then, sagless-spring clips are nailed to top edges of side rails, locating first pair $2\frac{1}{4}$ in. from the outside of the front rail and spacing remaining clips $4\frac{1}{2}$ in. on centers. Sagless springs are fastened to the clips and helical springs are added, after which springs are covered with burlap. Foam-rubber or rubberized-hair pad is applied to burlap, pad being cut 1 in. wider and 2 in. longer than frame. Next, cotton padding is added; then muslin cover and fabric cover. Back of chaise longue is covered with burlap, thin cotton layer and fabric. Underside is covered with cambric



W T M '55
Chaise Longue
Modern Furniture



MATERIAL LIST

Cabinet Wood

2 pcs.—1¼" x 2¾" x 14⅞"—Front legs

2 pcs.—1¼" x 2¾" x 14"—Back legs

Soft Maple, Poplar or Gum

2 pcs.—¾" x 3½" x 25½"—Front side rails

2 pcs.—¾" x 5" x 28¾"—Center side rails

2 pcs.—¾" x 9¼" x 36"—Back side rails

2 pcs.—¾" x 17½" x 25"—Front and top rails

2 pcs.—¾" x 3" x 25"—Center crossrails

Miscellaneous

14—8-ga. sagless springs, 24" long

28—Sagless-spring clips

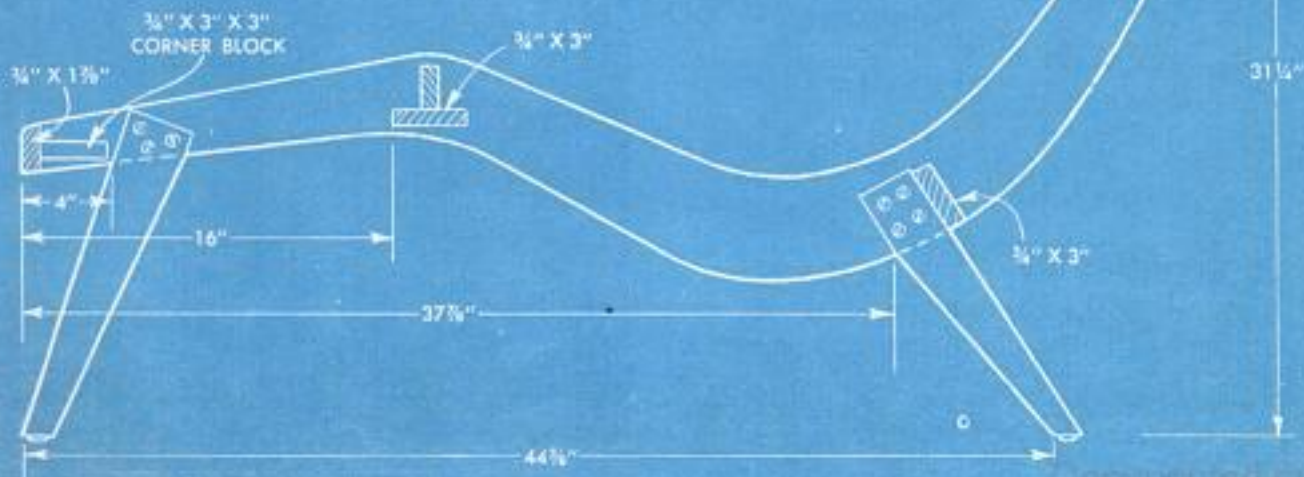
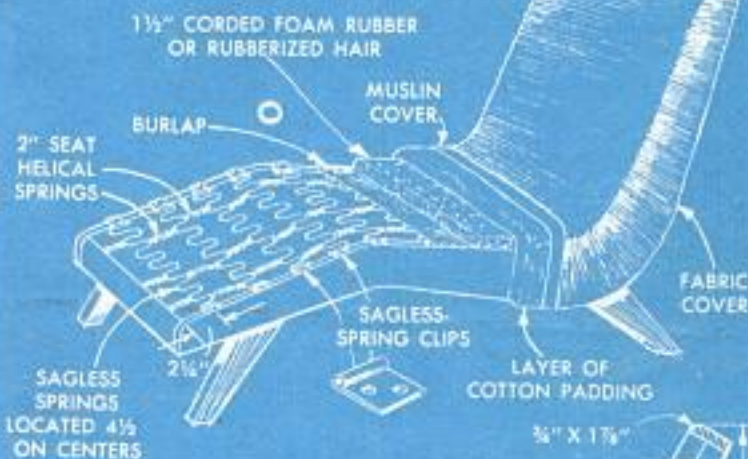
45—2" Seat helical springs

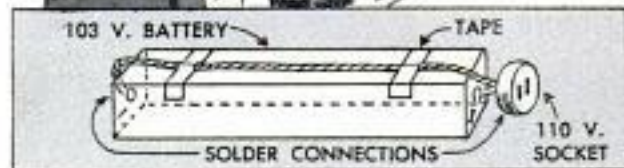
1 pc.—1½" x 28½" x 66" Corded foam rubber or rubberized hair, medium density

3½ yds.—Upholsterer's cotton

3 yds.—Burlap

3½ yds.—54" Fabric cover





Power for Electric Shaver Supplied by Dry-Cell Battery

You can use your electric shaver no matter how far your camping trips take you from electric power if you carry this dry-cell power pack. The dry-cell battery may be one of several types which develop from 90 to 110 volts. Used in portable radios, the batteries are about 1-ft. long and 1-in. square. A 110-volt socket is wired to the battery, as shown in the detail, providing a means of connecting the shaver. With intermittent service, as in supplying current for a daily shave, the battery will last through a two weeks' vacation.

John W. Sherman, Mountain View, Calif.

Matchbook Cover Holds Flies In Sportsman's Hatband



To carry dry flies and fishhooks where they are easy to reach when he needs them, one sportsman presses them into corks which he has glued to the outside of matchbook covers. The covers, in turn, are inserted under the band of his hat, as shown. A number of flies may be kept at hand in this way.

Waterproof Your Hunting Boots

Hunting boots can be given a longer life and be made waterproof if they are soaked in a preparation consisting of mutton tallow, 5 parts; beeswax, 4 parts; and rosin, 2 parts. Heat and blend this mixture in a

shallow pan large enough to accommodate the boots and immerse the soles in it while the preparation is warm. Soak until the leather is thoroughly impregnated.

E. Dzus, Prince Albert, Sask., Can.

Rubber Ball on Fishing Rod Lessens Hand Fatigue

A child's rubber ball can be used to greatly lessen hand fatigue when holding a fishing rod for long periods of trolling and reeling. Using an ice pick or narrow-bladed knife, cut a hole in a solid, sponge-rubber ball. Make the hole just big enough to slide the ball snugly onto the handle of the rod at the point where it is usually gripped. Each time it is used it is adjusted to the most comfortable position.—L. Werner, Cleveland, Ohio.



Reflector Surfaces Renewed With Reflective Beads

When the reflector on a floodlight, auto headlight or photoflash gun has become so dulled that it is no longer effective, it can be restored to full usefulness by applying a coating of reflective glass beads. Available at art-supply shops, the beads are of the type used in making reflective highway signs. To refinish the reflector surface, brush on a coat of aluminum paint. Allow the paint to set until it becomes tacky, then flow the beads over the surface. The beads will adhere to the paint, making a smooth, even coating. In some cases this refinished surface will reflect more light than the original.



NEW FACES For OLD CEILINGS

By James R. Ward

LIKE CEILINGS in many older homes, the plastered ceiling in one of our bedrooms had cracked badly and was loosening from the wooden lath in a few places. This condition necessitated a new ceiling. However, we wished to avoid removal of the old ceiling if possible as this would reduce the cost, and the resultant plaster dust would infiltrate the entire house.

After checking with informed sources, we learned that we could plaster right over the old ceiling by using gypsum lath as a base for the new plaster. Since our old plaster was still adhering to the lath fairly well, we could nail the gypsum lath through the old plaster and into the ceiling joists to hold it securely.

Gypsum lath is applied to ceiling over old plaster. Nails are driven into joists at 4-in. intervals, lath-section ends being butted directly over joists

Joists spaced 16 in. on centers are easy to locate, but in older homes joists may be spaced irregularly. Here, holes must be made in ceiling to locate them



Base-coat plaster comes packaged with aggregate ready-mixed, requiring only addition of water. Reduces chances of error





Original ceiling is completely covered with gypsum lath and ready for new plaster. Only a 1/2-in.-thick layer of plaster is required to cover the lath base



Old plaster has been removed from cracked area at corner of room. Expanded metal lath is nailed in corner and area is replastered along with ceiling

On ceilings where the plaster keys between the wooden lath have been sheared off so that the plaster sags badly, furring strips should be used to provide a good nailing surface for the lath. In that event the old plaster should first be removed and the furring strips nailed to the joists, spacing them 16 in. on centers. Use 8d common wire nails for this job. If the plaster is not removed, as in our case, the nails should be long enough to reach through the plaster and penetrate the joists approximately 1 1/2 in.

Gypsum lath is easy to apply and goes up fast, thus saving labor costs. It provides a level, uniform surface for plastering and, unlike many types of lath, requires only a 1/2-in. thickness of plaster over it. This combination provides unusual fire resistance because the lath as well as the plaster is a protection against fire.

When nailing the lath, apply the sheets with the long dimensions at right angles to the joists. All lath ends must have bearing on wooden framing, headers or nailing blocks, and must be nailed securely. Nails should be driven so the heads are just below the paper surface without actually breaking the paper.

We used ready-mixed, light aggregate gypsum plaster for the base coat. This new packaged plaster requires only the addition of water. It is light and easy to handle, and puts less load on the joists, which is important when applying a new ceiling over an old one. Also, it avoids the common hazard of bad sand, and over-sanding is automatically avoided.

The base coat may be applied in one coat, thus saving time and labor costs, and permitting quick use of the room.

In the finishing operation on the base coat, two tools are used generally, a rod and darby. The rod is a long straightedge used to level out the surface and remove



Plasterer uses rod (straightedge) to level surface and remove excess. Final leveling is done with darby (long float) which also produces roughened surface

excess material. A darby is wood 1/2 in. thick, 4 in. wide and 4 ft. long. It is used for the final beveling of bumps and hollows.

This coat may be applied 24 hrs. after the base coat. A ready-mixed gypsum trowel finish was selected for the finish coat. It produces an extremely hard finish that can be decorated just as soon as it dries. Applied to a thickness of 1/16 to 1/8 in., the finish coat should be troweled to a blemish-free surface.

Besides applying a new ceiling, it was necessary to repair a bad corner crack. To do this, the loose plaster was removed down to the lath and cut back from the corner 2 or 3 in. on both sides. Then, a strip of metal lath was bent to fit the corner and nailed to the corner stud and the masonry wall. After wetting down the exposed wooden lath and old plaster edge, the corner was plastered in the same way as the ceiling. ★ ★ ★



Photo above shows base coat of lightweight-aggregate plaster being applied. Ready-mixed avoids common problems of using bad sand or oversanding



Last of base coat is being troweled on ceiling. Note above how plaster is troweled toward center of room. Light weight of ready-mixed plaster makes job easy



Break in wall is repaired same as ceiling, leveling with float. Roughened surface on plaster formed by float or darby is needed for finish-coat adhesion



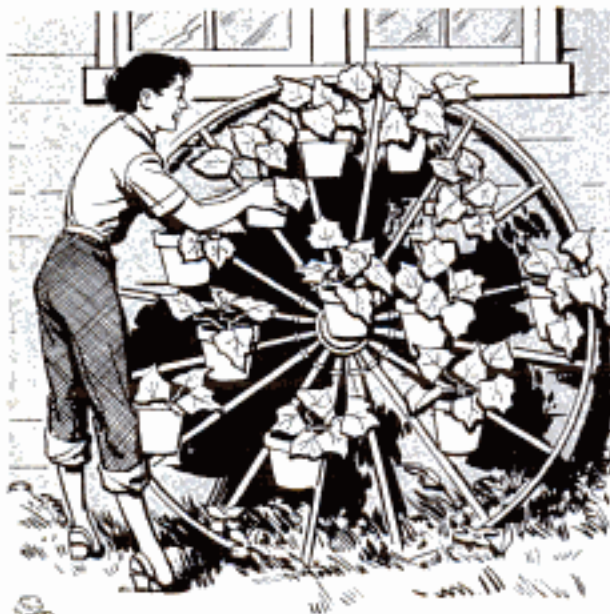
Finish coat can be applied 24 hrs. after base coat. Photo above shows start of finish-coat application, beginning at side of room and working toward center

Ready-mixed plaster is applied in thickness of 1/16 to 1/8 in. and good workability permits long, sweeping strokes with trowel, as shown in the photo below

Finish coat is applied to break in room corner, below. Ready-mixed plaster may be decorated as soon as dry—in most cases, two days after application



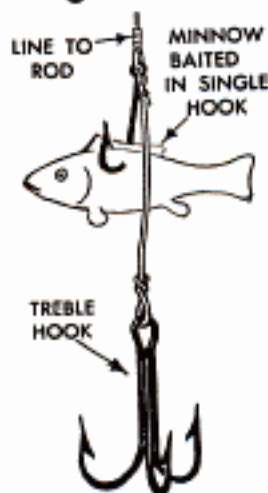
Flowerpots on Wagon Wheel Increase Its Useful Beauty



An old wagon wheel used as a yard ornament will become even more decorative and useful if flowerpots containing various kinds of flowers are wired to the wheel. Because the pots are up off the ground they are more easily tended and kept free of weeds. When cold weather approaches, it is a simple matter to remove the pots from the wheel and take them indoors.

L. H. Houck, Jefferson City, Mo.

Snag Hook Catches Nibblers



When you use a fishing line rigged with a snag hook as shown, very few of the fish who nibble at your bait will get away. A treble hook is attached to the eye of the bait hook, so that it hangs about 2 in. below the minnow, worm or other bait. At the slightest nibble, the rod is jerked sharply, and though the fish may not have taken the

bait, he will be snagged on the treble hook before he can get away.

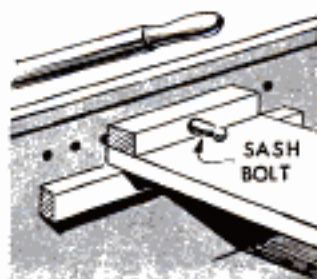
Floors Given Light Wax Coat

When applying wax to hardwood floors, keep in mind the fact that too much wax darkens the wood and collects more dirt. To avoid putting on too heavy a coat, fill an old sock with the wax and apply it by rubbing lightly. You will find that a little wax

and more polishing gives better results. It is better to apply light wax coats more frequently than to apply one heavy coat. Also, be sure to use light coats if a power polisher is used. Heavy coats of wax have a tendency to "pile up" under the action of a power polisher.

Adjustable Rower's Seat For Flat-Bottom Boat

The seat of a flat-bottom boat can be made adjustable, so persons of different height may row in comfort. To do this, the seat is removed and fitted with a sash bolt



which is inserted in a cleat on each side, as shown. A series of shallow holes are drilled in each side of the boat, into which the sash bolts fit, and cleats are nailed under these to support the seat at the same height as the original installation.

G. E. Hendrickson, Argyle, Wis.

Old Railroad Ties in Garden Add Attractive Rustic Touch

An old railroad tie is an unromantic sort of thing and yet, when used in the garden, can help to provide an attractive rustic touch. In the photograph, a retaining wall at the end of a terrace has been built by stacking the ties. They also can be used to make garden steps, benches, terraced flower beds and wooden walks. The ties frequently can be obtained at no cost from railroads because the old ones usually are burned when new ones are laid. It is advisable to borrow a truck or trailer to haul the ties, as the creosoted wood is extremely dense and heavy.

Martin Snyder, New York City.



WTM 55

Things to Do With MILK CARTONS

By Jim Miller



Cutting down a milk carton to a height of 2 or 3 in. provides a neat, throwaway holder for solvent when cleaning small parts



"Mopping up" after cleaning paintbrushes is simple if a disposable milk carton is used to hold the turpentine or thinner



There's nothing as handy as these wax-coated cartons for carrying fishing worms, above, or starting house plants, right



Because of the intense heat with which they burn, the wax-coated milk cartons are just the thing for lighting bonfires

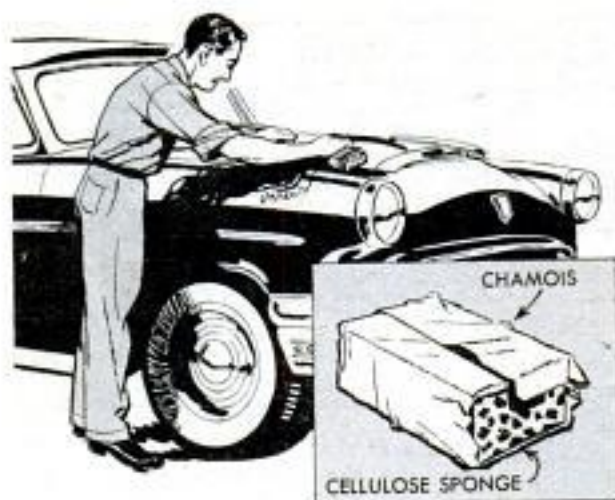


Above, there's no need to hunt for an empty can for small amounts of paint. A milk carton solves the problem nicely



Like mixing glue, above, the countless shop uses for milk cartons make it well worth-while to wash out and save them





Sponge Holds Chamois Flat When Drying Car

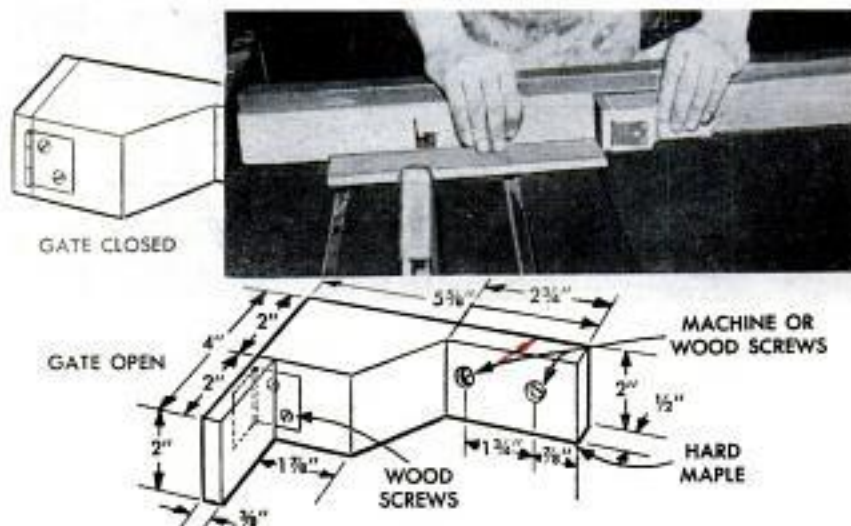
To eliminate the annoyance of having the chamois wrinkle and roll up when drying a car, wrap the chamois around a cellulose sponge. The chamois will stay flat and smooth, but will be flexible enough to follow the contours of the car body. The sponge may be the same one used to wash the car.—Hugh Lineback, Stillwater, Okla.

Soak Tools to Remove Rust

Rust can be removed from tools by soaking them overnight in a solution of ammonium citrate, 1 tablespoonful, mixed in clear water, 1 pt. After soaking, the tools are rinsed in water, dried and coated lightly with oil.

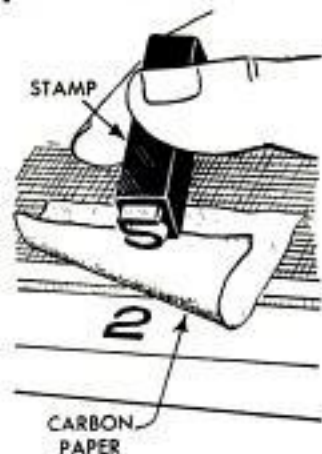
Hinged Stop on Miter Gauge of Circular Saw Eliminates Waste

When cutting several lengths of stock to precise measurements on a circular saw, this hinged stop will speed up the job and eliminate any possibility of waste. Two pieces of hardwood are cut to the dimensions shown, the large one being fastened to a bar that slides on an extension on the miter gauge. The smaller one is a "gate" hinged to the larger. In use, the gate is closed and the stop is set so the distance between the saw blade and the stop is the correct length for the finished piece. To make the first cut, the gate is opened and the stock run through the saw. This gives one square end, plus a $\frac{3}{8}$ in. margin for the other cut. The piece is now reversed, the gate closed and the second cut results



Storm Sash and Screens Marked With Carbon Paper and Die

A simple way to mark storm sash and screens is to stamp them with a set of number dies and a sheet of ordinary carbon paper. The carbon is placed on the area to be marked, and the number die is set on top of the paper and tapped with a hammer. Although the mark is fairly indelible, brushing a little varnish over the number will make it more completely weatherproof.



Insulation "Brushed" From Wire

A tin shield 3 in. square with a hole punched in the center of it to receive the wire is all you need to quickly strip the insulation from electrical wiring with a motor-driven wire brush. Push as much of the wire as must be stripped through the shield and hold it against the brush. The insulation will come off fast and clean. This is especially useful where a number of wire ends must be stripped, or where the insulation must be removed from a long piece of wire. Do not strip wire in this manner without shield to protect fingers.

WTM 55

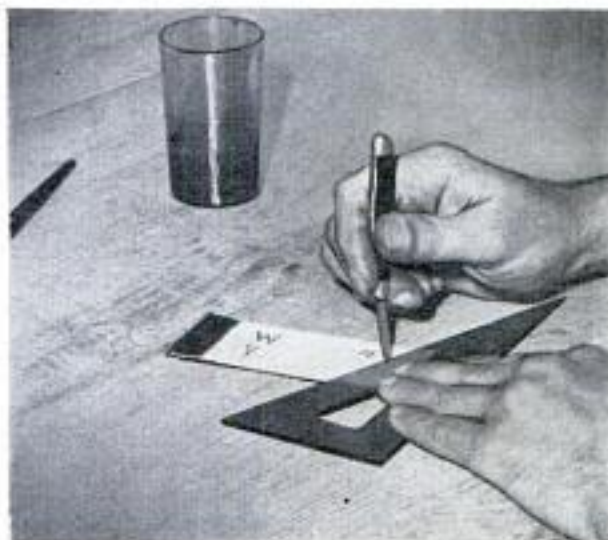
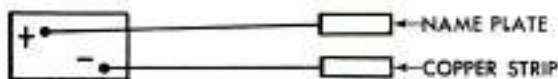
Electro-Etched NAME PLATES

By
John Burroughs

THERE'S NOTHING like an etched-metal name plate to give a finished, professional look to a model, dress up a trophy or serve as identification on a tool or instrument. Electro-etching name plates is so simple that anyone can do it without previous experience. The electro-etching process is nothing more than electroplating in reverse. The brass name plate is connected to the positive cell of a 6-volt automobile battery and a strip of sheet copper is connected to the negative. Both are hung in a fruit jar containing copper-sulphate solution, and the brass plate becomes etched wherever the solution contacts the metal. Any part of the plate protected by a resist, such as wax or cellophane tape, won't etch. The proper etching solution to use is copper-sulphate crystals, 1 cup, dissolved in water, 1 qt., and stirred until the solution is a clear blue color.

To prepare for etching, cut a strip of brass to the desired size, and dip it in hot paraffin. Then, using any pointed tool, scribe the lettering in the wax and etch. For letters in relief on an etched background, use cellophane tape as a resist. Clean the plate with a fine abrasive cloth and lay on a strip of tape as long as the line of letters you want. Rub the surface of the tape with an ink eraser until it will take pencil marks and then trace the letters on it. Cut around them with the point of a sharp knife or a razor blade and peel away the background. If you want a raised border, apply tape to form the border and then etch the plate.

Etching time is in proportion to the amount of metal you want removed. Hang the plate in the solution with the side to be etched facing the copper strip. The back of the plate need not be covered. An immersion of 15 or 20 min. gives a reasonably deep etch. When etching is complete, the plate can be buffed and dipped in clear lacquer to preserve the brightness or the etched recesses can be filled with colored enamel. Use a baking enamel, laying it on heavily with a small brush, and bake about 1/2 hr. at 150-200 deg.



Above, a sharp-pointed knife is used to cut out or scribe lettering before etching. Below, the completed name plate, with enamel baked around the lettering, is dipped in clear lacquer to preserve polish





Wrapping Materials Are Dispensed Through Bottom of Cabinet

For the housewife who uses various kinds of wrapping materials, such as waxed paper, aluminum foil and freezer parchment, this cabinet arrangement provides a neat and convenient method of storage. A 1/4-in. slot for each type of material is first sawed in the bottom of a wall cabinet. Standard holders are then screwed to the inside of the cabinet, placed so the paper or foil will feed through the slots. A cutting edge is provided by a hacksaw blade which is screwed to a 1/2-in. strip of wood which, in turn, is screwed to the bottom of the cabinet at one side of each slot. The wood strip allows the wrapping to be gripped with the fingers.

Hubert W. Farris, Albuquerque, N. M.

Method for Hanging Screen Door

When hanging a screen door, place several thicknesses of newspapers between the bottom of the door and the threshold before screwing the hinges in place to assure clearance after the door is attached.

Winifred N. Jones, Provo, Utah.

Call to Colors

Believe it or not, you can change the apparent size of a room without tools. It's a matter of creating an optical illusion by the proper use of colors. Objectionable details can be played down and gaiety or dignity given a room, all with color know-how. Read about interior colors next month

Rear Sight on Gun Painted Red To Improve Accuracy of Aim

By painting the rear sight red, hunters can improve the speed and accuracy of their shotgun and rifle aim. This is a trick widely used by pistol shooters in Olympic competition and is especially helpful on moving targets such as animals and birds, where speed in aim is essential.

Gustavo A. Balcells, Toledo, Ohio.

Outboard Motor Stored on Bracket Fastened to Exposed Studding

An outboard motor can be stored in the correct vertical position when not in use by means of a simple 2 x 6 bracket fastened to the exposed studding in the garage wall. Gasoline and oil spillage can be kept to a minimum and any water left in the motor will have less chance of seeping into the block. The bracket in the illustration was attached directly to the 2 x 4 studding. A larger motor might require the addition of a 2 x 2 spacer to keep the motor far enough away from the wall. If the motor is mounted high on the wall, space beneath it can be used for the storage of gas and oil.

Ivan Grosvenor, Indian Rocks, Florida.





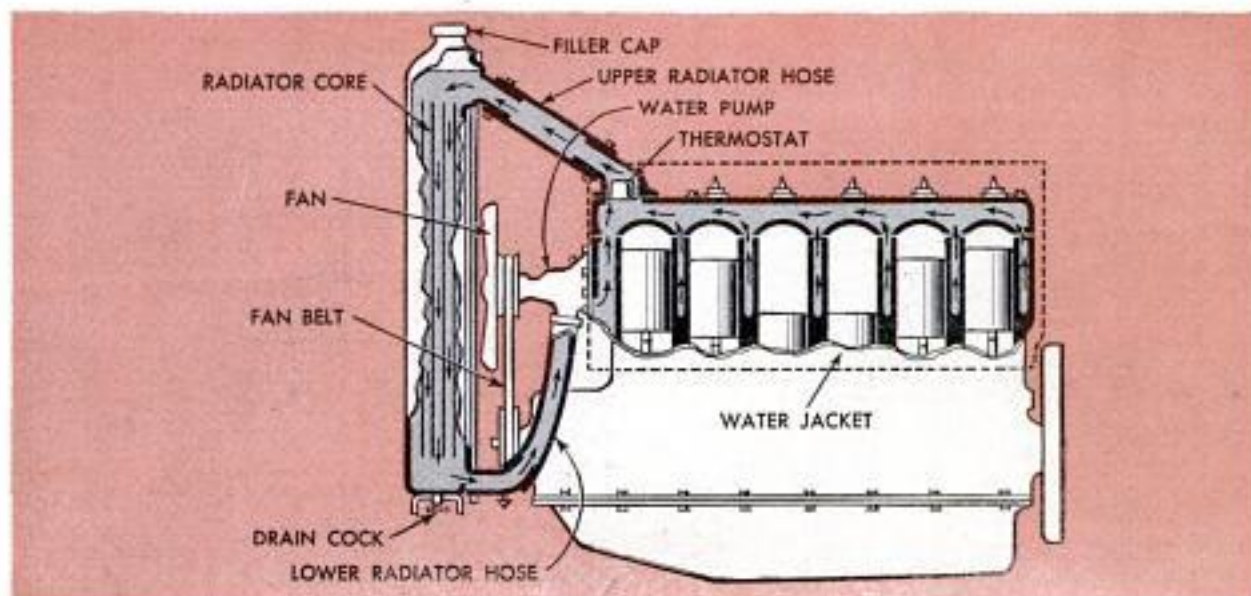
KNOW YOUR COOLING SYSTEM

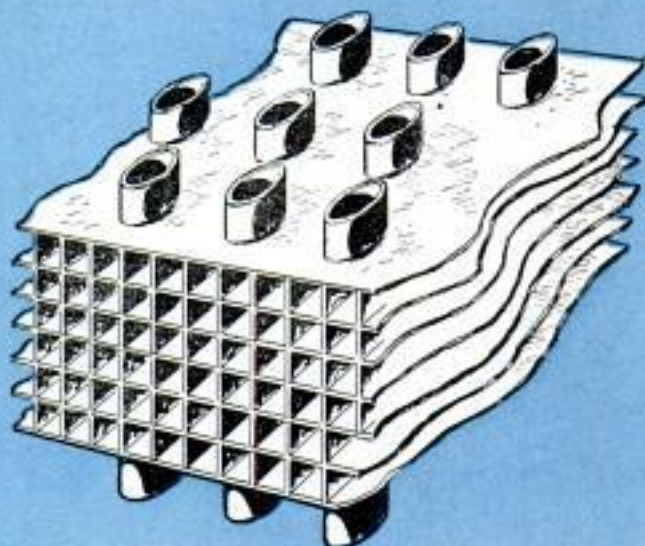
A SUDDEN SPURT of steam from the radiator often is one of the few reminders to the average motorist that his engine has a cooling system; then it's too late. Severe damage to the valves, rings or cylinder walls may have been caused by this time. When you realize that the average 6-cylinder L-head engine generates enough heat to keep a 6-room house warm, it is apparent that the cooling system must be functioning at maximum efficiency to keep the engine operating temperatures within safe limits. Only about $\frac{1}{3}$ of the heat energy is utilized as power. Of the waste heat remaining, about $\frac{1}{2}$ is dissipated through the exhaust system; the rest must be absorbed by the cooling system.

A cross-section of a typical passenger-

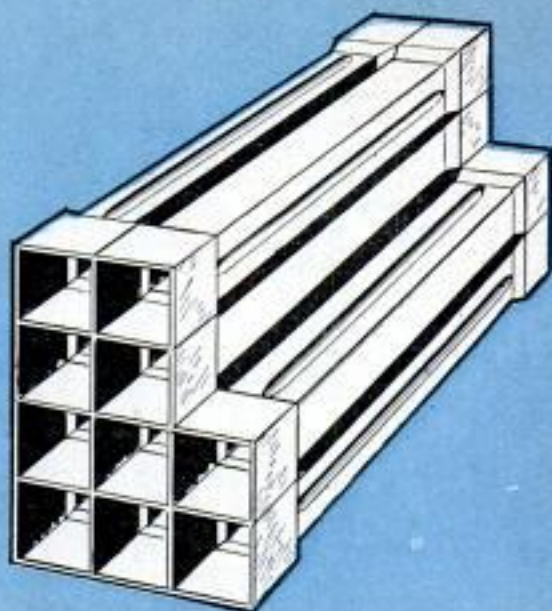
car cooling system is shown at the bottom of this page. It consists of a radiator, its hoses, a water pump and fan, a thermostat, and the water jacket around the engine. Water is circulated through the system when the engine is running and, as it passes through the water jacket, absorbs heat which it carries to the radiator where it is dispersed into the air flowing through the radiator.

The radiator consists of a core with small tanks at the top and bottom. There usually is a baffle plate just under the filler opening of the upper tank to prevent water from surging out the inlet or overflow pipe. The bottom tank has an outlet connection only. There are two main types of radiator cores—the cellular and the



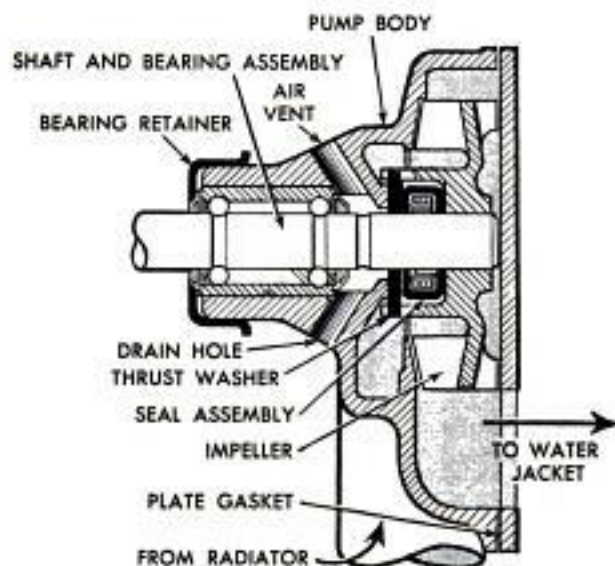
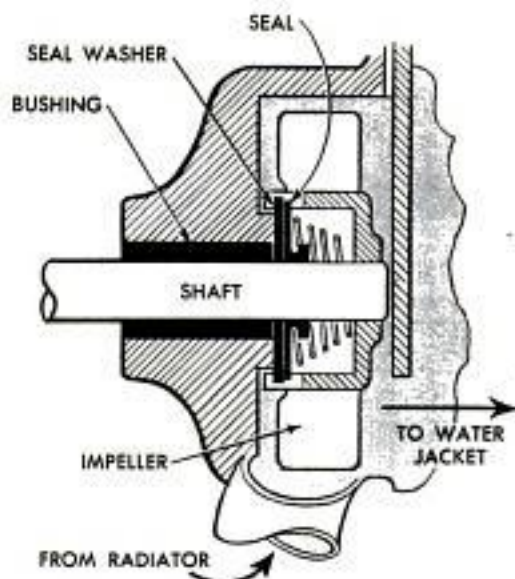


TUBULAR TYPE RADIATOR



CELLULAR TYPE RADIATOR

Below are detailed two kinds of centrifugal water pumps. Each has the packless-type water seal around the impeller shaft although details of assembly vary between the two. The main difference in the pumps is that one has a brass bushing for a shaft bearing, the other ball bearings for heavy-duty service



tubular. The cellular type is composed of short horizontal tubes or cells, their length determining the thickness of the core. Each tube has a flange around the four sides of each open end. When several thousand of these cells are soldered together by their flanges, water can flow around all four sides of each cell, thus presenting a huge radiating surface to the cooling air which flows through the inside of each cell. Although it is the most efficient heat-radiating device for any given size, the cellular type is expensive and does not lend itself to mass production as readily as the tubular type.

The tubular-type core is composed of vertical tubes of thin metal which extend through and are attached to closely-spaced thin metal fins. The top tank collects the hot water from the engine and distributes it across the radiator core, where it then runs down through the tubes. Its heat is dissipated through the tubes and into the fins where the air moving through the core picks it up and disperses it. The bottom tank simply collects the cooled water from the core and discharges it through the outlet to the water pump.

All modern cooling systems include a pump, located on the front or side of the engine, to circulate the water. It receives water from the bottom radiator tank and forces it through the water jacket, into the head and back to the radiator top tank. Almost all engines are equipped with the packless-type centrifugal pump. It has an impeller with blades which force the water away from it as it spins. The impeller is mounted on a shaft and is located inside the

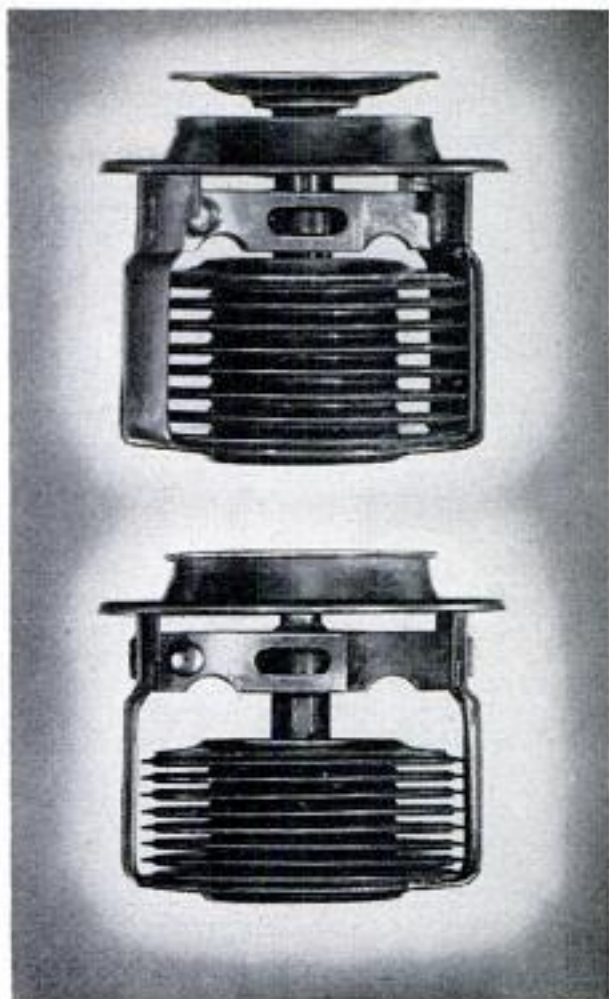
pump housing. The outer end of the shaft is fitted with a pulley driven by a belt which runs from another pulley on the front end of the crankshaft. On some engines the water pump is coupled to the generator shaft. The problem of keeping the water from leaking out around the shaft of the impeller is solved by a self-adjusting seal. Both water pumps illustrated have this type seal, though details of assembly vary. The main difference in the two pumps detailed is that one has a brass bushing for a shaft bearing, while the heavy-duty type in the lower detail has two sets of ball bearings. It also has a drain hole and air vent just in front of the seal so that any minor leak of water will be thrown clear. The latter type of pump is used on heavy-duty engines.

The fan, which on most engines is mounted as a unit with the water-pump pulley, draws a large volume of air through the radiator core to cool the water, and also provides direct cooling of the engine by blowing air over it.

The cooling system of an engine is designed to provide adequate service when the engine is operating under heavy loads and in hot weather. Under light loads or in cold weather, the same amount of cooling would be too much. Overcooling results in rapid engine wear; fuel and power are wasted because the heat energy that should be driving the pistons is absorbed by the cooling water. To prevent overcooling, a thermostat is used to control the flow of water. The most commonly-used thermostat is the bellows type, shown in the upper illustration on this page in both the open and closed positions. The bellows expand with heat and contract with cold, thus opening and closing the thermostat valve. The thermostat usually is located in the outlet of the cylinder head, as shown in the cross-section on page 197. When the engine is cold, the thermostat is closed and prevents the water in the water jacket from flowing into the radiator. When the engine warms up, the thermostat slowly opens, permitting the water to circulate.

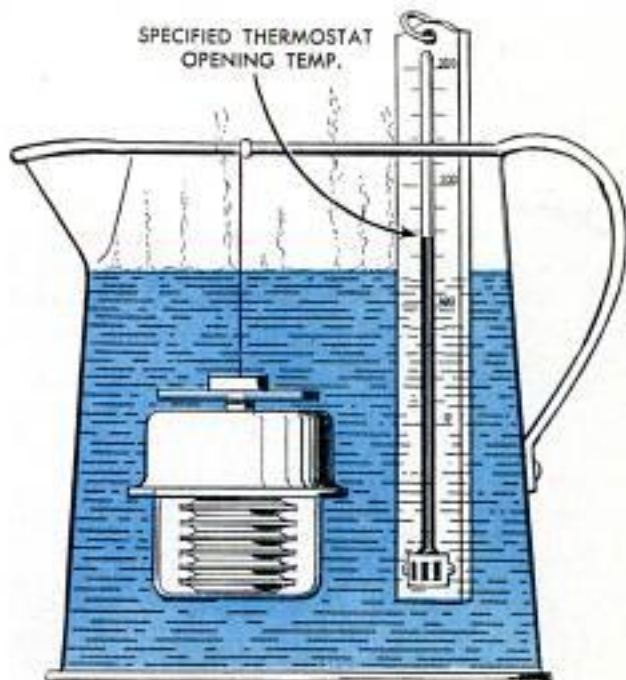
Many radiators are equipped with a pressure cap on the filler which seals off the overflow pipe during normal operation to prevent loss of water due to surging and, by keeping the water under pressure, raises the required boiling point of the water.

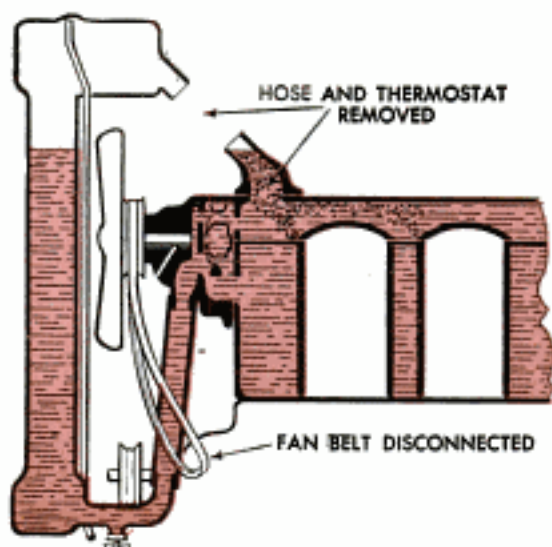
The engine water jacket consists of a number of passages inside the engine block and cylinder head. It completely surrounds the cylinders for their full lengths and carries water around the valve seats. The water jacket in the cylinder head covers the combustion chambers and in valve-in-head engines also cools the valve seats. Many L-head engines also contain a water



In the photographs above is shown the commonly used bellows-type thermostat. A liquid in the bellows boils at a predetermined temperature and expands the bellows which lifts open the thermostat valve. The upper photo shows the thermostat in the open position

Below is illustrated the method for testing thermostats to determine whether they are opening at the proper temperature range. The thermostat is suspended in water and heated to the specified temperature





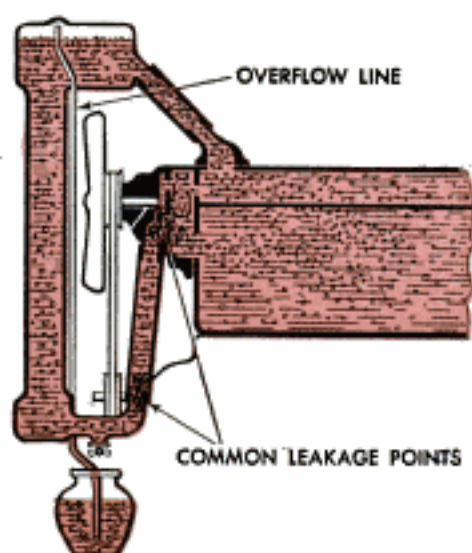
Test for combustion gas leaks in the water jacket caused by bad head gasket or cracks in head or block

distribution tube in the water jacket which extends horizontally back from the water pump. Holes in the tube direct water against the underside of the exhaust-valve seats.

Although water has excellent heat-transfer properties and is available almost everywhere, it has definite drawbacks. It has a comparatively low boiling point, a fairly high freezing temperature and a natural corrosive action on metals. A radiator completely filled with water will overflow when the water heats and expands. Antifreeze must be added to the water in cold weather to prevent freezing. Rust-inhibitor should be kept in the water when no antifreeze is used. Standard antifreeze solutions contain a rust-inhibitor of their own which is efficient.

When checking an automobile for overheating, be sure that the brakes are not dragging and that there is plenty of oil in the crankcase. Bad ignition timing also will cause overheating. Examine the engine for external leaks in the hoses, radiator and head gasket. Be sure the fan belt has only about 1 in. of play. If it is frayed or oily, it should be replaced. Test the thermostat by suspending it in water and heating it to the specified temperature, as shown in the illustration on page 199. If the thermostat opens at a temperature more than 10 deg. F. below specified temperature or fails to open at a temperature of 10 deg. F. above the specified temperature, it should be replaced with a new one.

Check for internal leaks of combustion gas into the water caused by a leaking head gasket or cracks in the cylinder head or block. To make this test, remove the upper hose and thermostat, drain the water down to the level of the engine block and disconnect the fan belt. Then pour water into the



Test for air suction in system. Air will cause foaming and loss of heat-transfer properties of water

radiator until the water outlet on the head overflows. Start the engine and accelerate it 6 or 8 times. If bubbles appear it indicates a combustion leak.

Next, check for air being sucked into the cooling system. This causes foaming which greatly lowers the ability of water to absorb heat. The foaming water also will overflow, causing a low water level. Air suction usually occurs through a leak in the pump or in a connection between the pump and radiator. To test for this trouble, lower the water level enough to eliminate the chance of overflowing from expansion. Then block open the pressure valve on the outlet cap and tighten it securely on the radiator. Attach a hose to the overflow pipe and insert the free end in a container of water. Run the engine until the temperature remains constant. Then, with the engine running at a fairly rapid speed, watch for air bubbles in the container. If there is no internal leakage of combustion gases, the presence of bubbles indicates air is being sucked into the cooling system.

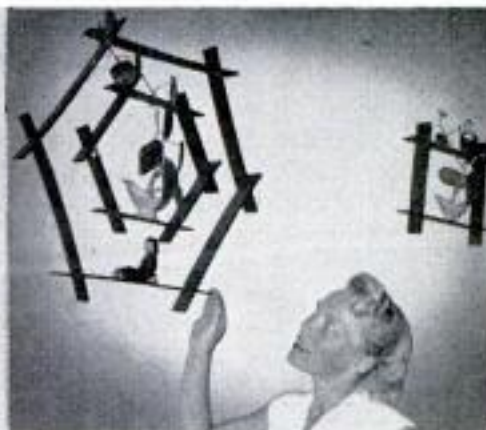
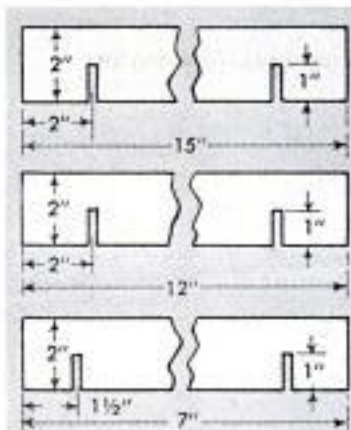
If your engine runs too cool, check the thermostat and, if necessary, cover part of the radiator to adjust the temperature to a safe level.

Inspect your radiator core every spring and fall. If it needs cleaning, use a good grade of cleaning compound and reverse-flush as directed on the package. A badly clogged radiator will require the services of a professional radiator-cleaning shop. There are devices on the market which may be suspended in the radiator to assist in preventing corrosion and clogging in the radiator core.

As in other parts of an automobile and its engine, preventive maintenance will eliminate trouble and save money. The cooling system must function efficiently. ★ ★ ★

"Kit" Permits Variety of Bric-a-brac Shelves

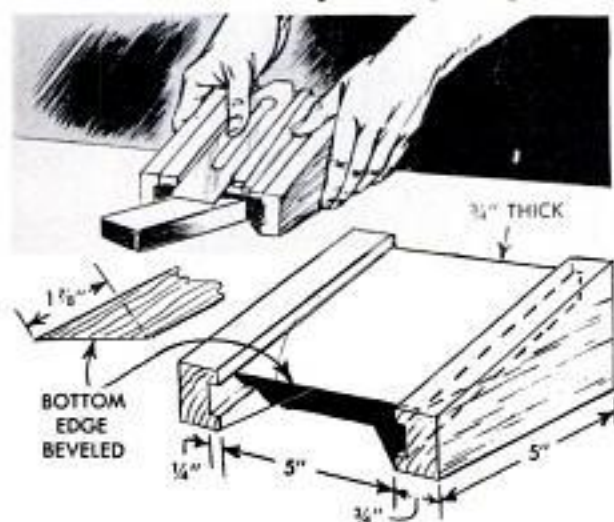
An infinite variety of sizes and shapes of bric-a-brac shelves can be assembled from precut and notched hardboard strips. The hardboard is cut into strips 2 in. wide, in 9, 12 and 15 in. lengths. Slots $\frac{3}{8}$ in. wide and 1 in. deep are cut 2 in. from both ends of the 12 and 15 in. lengths, and $1\frac{1}{2}$ in. from the ends of the 9 in. lengths. With a number of strips on hand, various combinations may be tried until a suitable size and shape is found. The unit can then be glued, and later painted or finished to match any decorating scheme. The best



type of hardboard to use is that which is finished on both sides. It is available in $\frac{1}{8}$, $\frac{1}{4}$ and $\frac{1}{2}$ -in. thicknesses.

George Van Volkenburg, Key West, Fla.

Plane-Iron Sharpening Jig Is Made From Wood Scraps

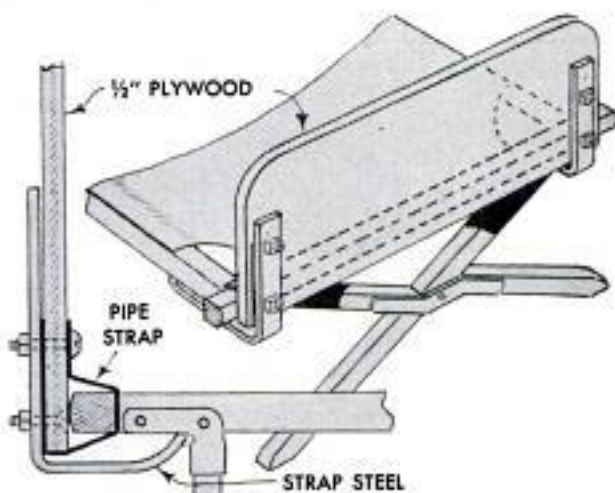


Holding a plane iron at the correct angle for sharpening the cutting edge can be done quickly and accurately by using this jig. The two sides are cut to taper 2 in. in the 5 in. length. The top piece, which should be about twice as wide as the sharpening stone, is held in grooves cut in the side pieces. The bottom edge of the top piece is beveled to be parallel to the surface of the stone. The distance from the bottom of the jig to the underside of the top plate is determined by the thickness of the stone. To align the iron for sharpening, a block is placed on one side and two thin wedges on the other. Clamping the blade down will cause it to dig into the stone.

Edward E. Thorp, Montclair, N. J.

Pillow Kept on Camp Cot by Removable Headboard

Tired of having the pillow fall off the end of his folding cot and groping around in the dark to find it, one camper fitted his cot with a removable headboard. The board itself is a piece of $\frac{1}{2}$ -in. plywood, 4 in. wide and 29 in. long which is sanded smooth and waterproofed with two coats of spar varnish. Two lengths of light pipe strap are formed to go around the wooden cot spreader and fastened to the headboard. Two pieces of $\frac{3}{16}$ in. x 2-in. flat steel are bent to form L-shape brackets, one end of each being bent upward to bear against the side rail of the cot. A $\frac{1}{4}$ -in. flat-headed stove bolt is used in the lower hole of the bracket so it will clear the spreader bar. To remove the headboard when folding the cot, just pull out the spreader bar and lift it off. The headboard can be strapped to the cot when transported or stored away.



☛ To remove mustard stains from fabric, rub the spot with glycerin and then wash in soap and water.

MODELING THE MIDWAY

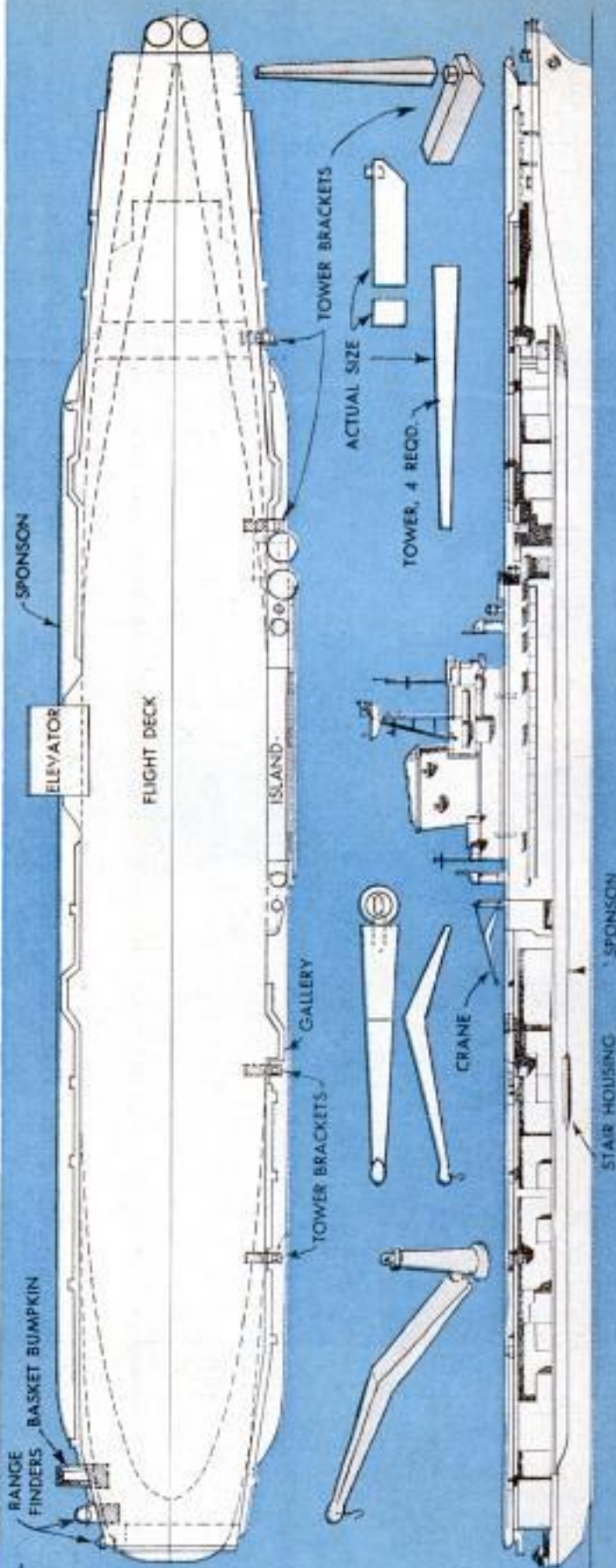
Part III

By Paul Strayer

NOW THAT YOU have completed the flight deck, the gallery piece and the cover board which make up the upper three-piece assembly of the model *Midway*, you are ready to tackle the superstructure called the "island." Here in this island on the starboard side of the actual ship is installed the maze of incredibly complicated apparatus upon which virtually depends the operation of the carrier. The island is an immense structure, measuring some 12 ft. wide and 130 ft. long. The huge stack itself rises approximately 40 ft. high and is 50 ft. long.

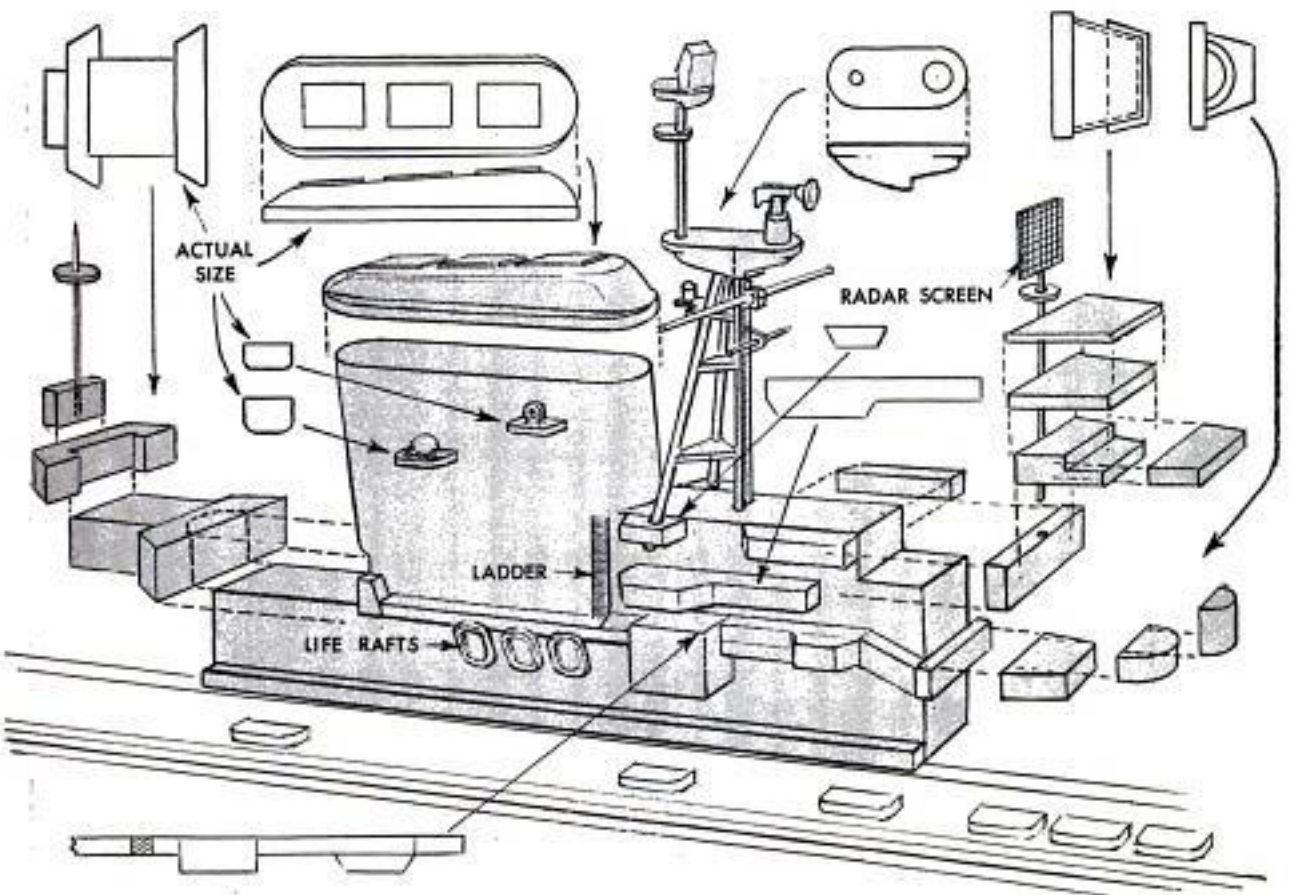
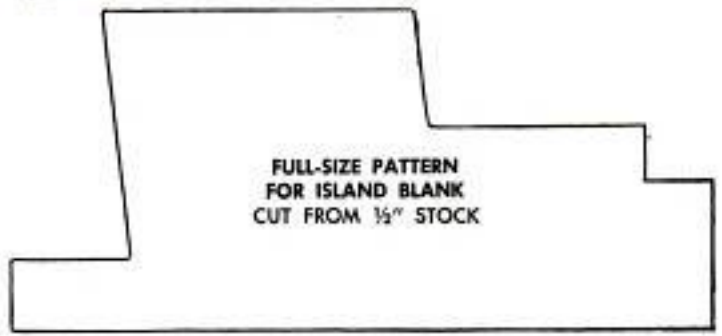
The island on your model of the mighty *Midway* measures only a mere 3 in. long and yet it is minutely detailed. Begin by tracing the full-size pattern for the island, which is given on the opposite page, on a block of 1/2-in.-thick pine and then saw it neatly to line. You'll note in studying the drawing on the opposite page that this piece serves as a blank to which all the tiny component parts are glued. All these parts are shown actual size to make it easy for you to duplicate them simply by taking measurements with dividers. The portion of the island block that represents the stack, or funnel, is rounded at each end with a file and sandpaper. The rakish stack canopy is a separate piece, glued in place so it overhangs the sides of the stack but not the ends. The three squares on top of the canopy are cut from thin cardboard, such as Bristol board, and are glued in the position indicated. The island blank is held to the flight deck with two 1/8-in. dowels.

The tripod mast, which is a part of the island, is preassembled in a

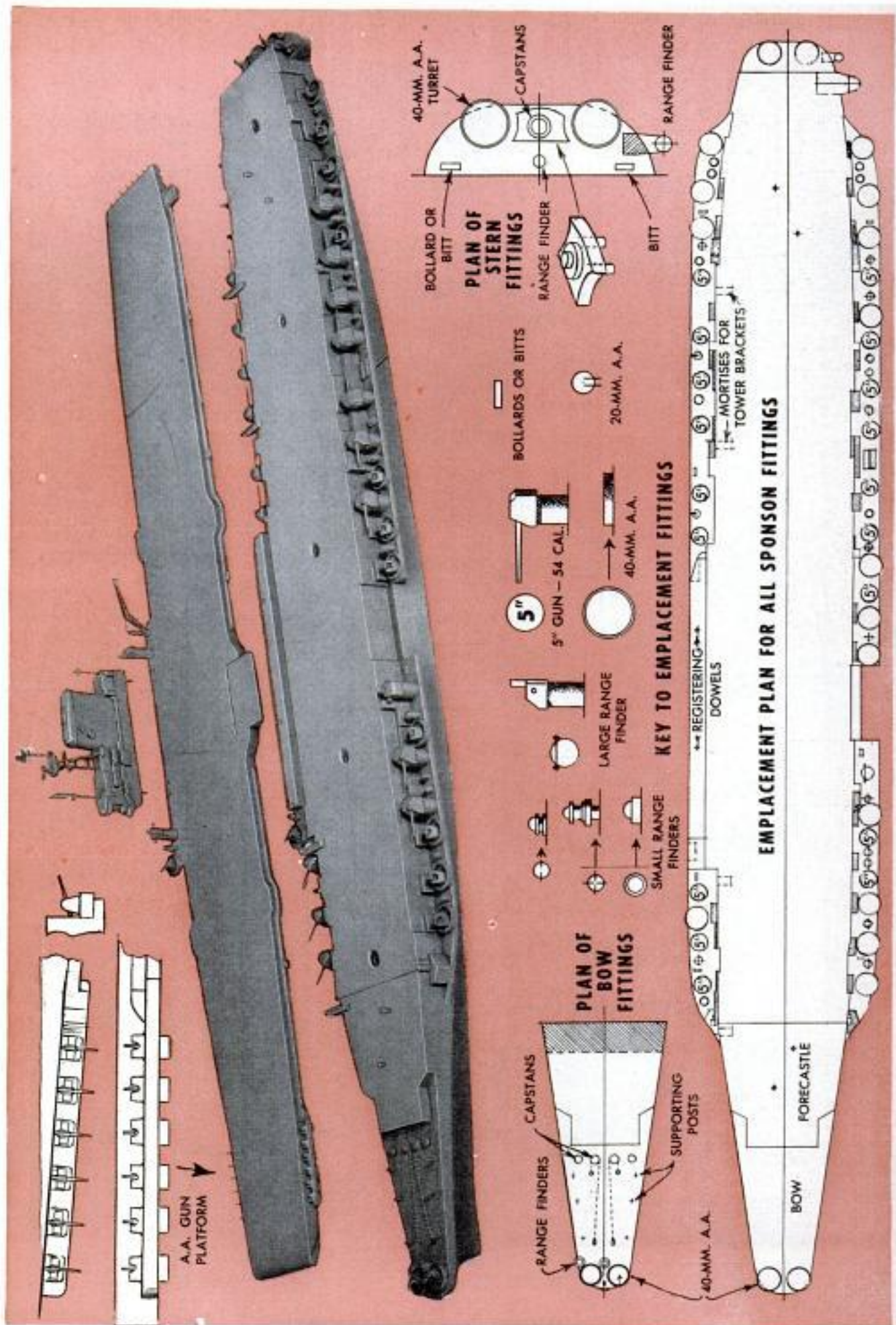


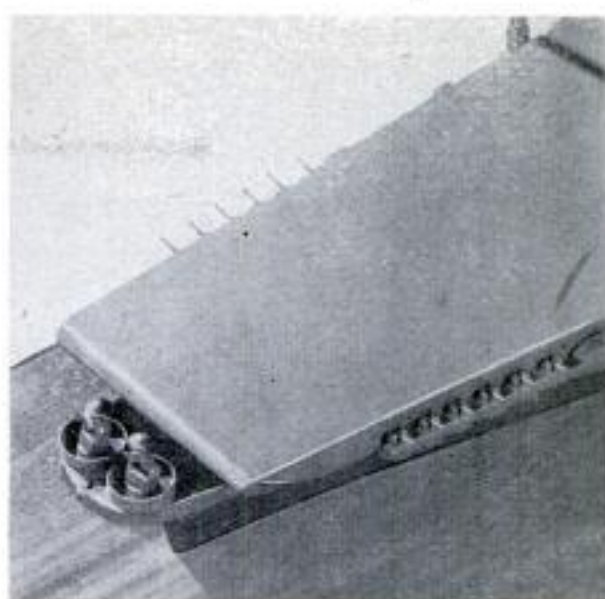
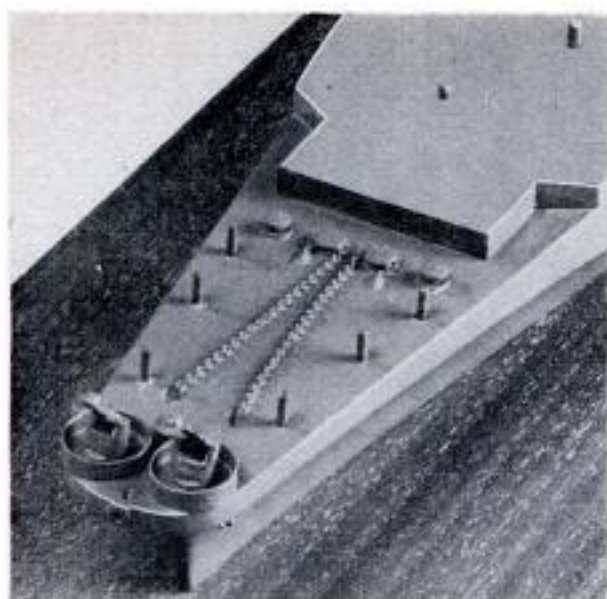


ASSEMBLY OF TRIPOD MAST



PULLAPART ASSEMBLY OF ISLAND SUPERSTRUCTURE





Closeup views at the bow. In the left-hand photo the flight-deck assembly has been removed to expose the deck fittings on the forecastle. Note in the right-hand photo the batteries of 20-mm. AA guns, each side

jig. Drill three holes in a scrap piece of wood, following the triangular plan of the tripod base. The forward hole should be drilled vertically, about $\frac{3}{8}$ in. deep, while the two aft holes should be spotted so they will fall at a point where two small galleries jut from the sides of the island blank. These aft holes should slant inward so that all three legs of the tripod will meet at the top. The legs are cut from 54-ga. drill rod and should be long enough to support the mast platform about 1 in. above the deck. The three legs are soldered together at the top. When this is done, the mast can be removed from the jig and set in position on the island. Note that the aft legs of the tripod extend just barely below the galleries which jut from each side. The small triangular-shaped braces between the legs are cut from thin pieces of metal or cardboard and are fitted in place by gently forcing them upward between the rods with tweezers until they wedge in place. A spot of shellac or quick-setting household cement applied with a toothpick will hold them in position. The small platform supported by the mast is drilled to fit down over the soldered ends of the three legs.

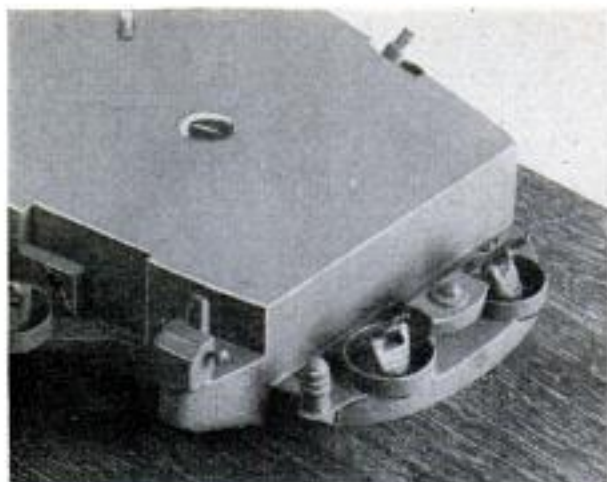
The two signal masts are made from 58-ga. drill rod and the $\frac{1}{16}$ -in.-dia. platforms which fit down over the ends are cut from thin Bristol board. The radar screen is made of the same material and one side is scored to represent the screen. The remaining components of the tripod mast are made from bits of wood, following the actual-size patterns of each, and are fastened to the island block in their respective positions with quick-setting cement. The two ladders, one on the tripod mast and the other on the starboard side of the stack, are cut from single-ply Bristol board and

measure $\frac{3}{16}$ in. wide. Scored lines represent the ladder rungs.

Deck fittings: The position of the various fittings on the forecastle (not to be confused with the forecastle piece previously discussed in Part I) is shown in the bow plan on page 204 and the left-hand photo on page 205. The fittings consist of two 40-mm. A.A. turrets, two large, low capstans around which the anchor chains pass, two smaller capstans, two range finders and six supporting posts for the overhanging forward deck. The posts are 54-ga. drill rod set in holes and made long enough to touch the underside of the flight-deck assembly. The anchor-chain size is 24 links to the inch and it can be purchased from most ship-model supply shops. Two lengths of chain are needed and each one is installed by inserting one end in a simulated hawse pipe, which is simply a hole drilled in the deck, and securing it with a drop of quick-setting cement. The other end of the chain is brought around one of the large capstans and carried forward $\frac{1}{4}$ in. and into a spurling gate. Again, the spurling gate is represented by a hole in the deck and the chain is anchored with a drop of cement.

The deck fittings at the stern consist of two 40-mm. A.A. turrets, two range finders (one being raised between the two turrets) a capstan and two bollards. These bollards, or mooring posts, also appear in various positions on the sponsons. Each one is made by cementing a tiny Bristol-board rectangle, $\frac{1}{16} \times \frac{3}{16}$ in., to the surface and then driving two minute lengths of 76-ga. wire in predrilled holes in the board. These tiny bollard fittings can be omitted, if you wish, without any appreciable loss to the appearance of the model.

Crane and tower patterns are given in



Closeup view of stern with flight-deck unit removed, shows the arrangement of the various deck fittings

the drawing on page 202. The towers are made from a strip of wood $\frac{1}{8}$ in. square. I find it more practical, in working small parts like this, to shape them individually from a long strip and then cut them off to the specified length. The towers taper from a point $\frac{3}{16}$ in. from the bottom and are $\frac{1}{32}$ in. square at the upper end. The four towers are supported by brackets which jut beyond the edge of the flight deck. You may recall that notches for the tower brackets were previously formed when the notched piece was cut. Glue and small lils (dress-

maker's pins) are used to anchor the brackets in their respective notches. Properly fitted, the brackets will project half their thickness above the surface of the notched piece. You'll notice that the towers are actually tenoned to the brackets to reinforce them. A hole is made in the lower end of each tower to set over a tenon fitted in the end of each bracket. With careful handling, however, the towers merely could be glued to the brackets as the plastic case will protect these fragile parts from breakage. The crane is carved from a single piece of wood, and the crane tower is turned from a short length of dowel, the tower measuring $\frac{1}{2}$ in. high.

The life rafts are cut from 3-ply Bristol board, $\frac{3}{32}$ in. wide and $\frac{7}{32}$ in. long. Round the ends and dish the center with the flat head of a nail, filed oval shape to leave a $\frac{1}{32}$ -in. margin all around the edge of the raft. As shown on page 203, three of these are cemented in a row to the starboard side of the stack, letting them slant inward to touch the surface.

In a concluding article next month you will be told how the range finders are made, as well as the 5-in. guns and turrets and the 40-mm. anti-aircraft guns and carriages. Details also will be given for mounting the model, painting it and building a protective plastic case. ★ ★ ★

Popular Mechanics Bookshop



For Photographers

Here's a basic handbook on photography. *How to Take Better Photographs*, in clear text and illustrations, takes you through all the essential steps. Starting with equipment and picture-taking techniques, it covers lighting, composition, and darkroom know-how. The price is \$2.50



For Teen-agers

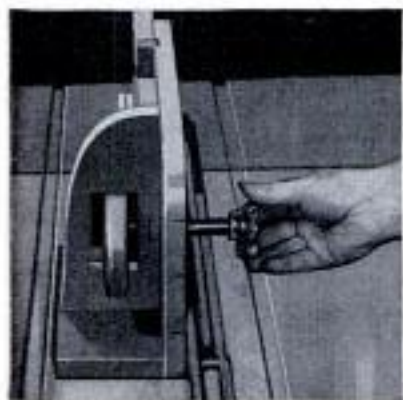
How and Where to Obtain a Summer Job is the book for youngsters graduating from high school or working between college terms. This directory tells where to look for jobs, how to choose them and what jobs are likely to serve as training for a lifetime occupation. Price, 75 cents



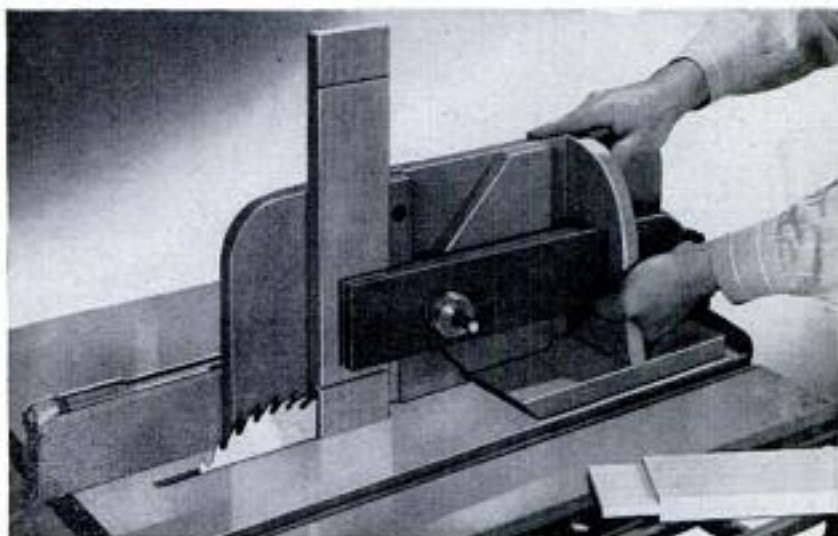
For the Golfer

Directory of Golf Courses covers the courses on the North American continent. Included are all the vital statistics—name, location, number of holes, yardage and type of greens. The author rates each course and makes valuable comments on all of the tricky holes. The price, \$1.00

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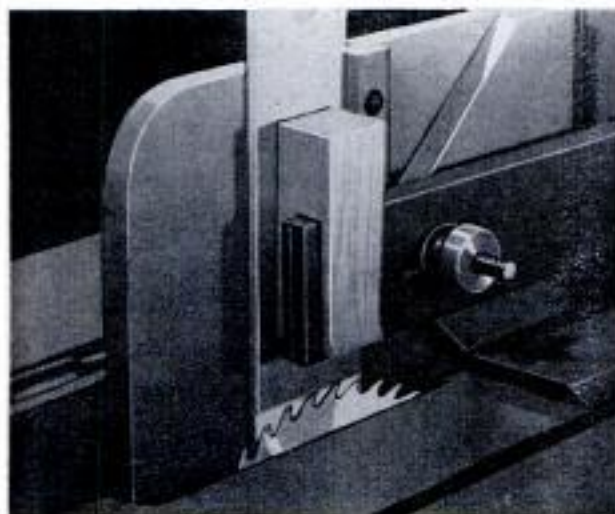
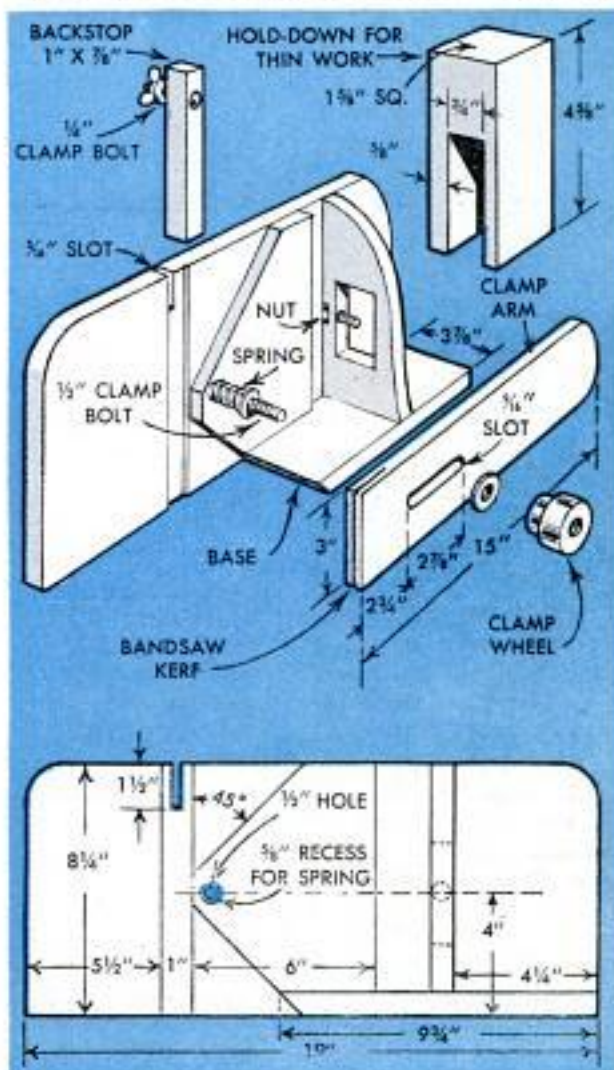
Before running cut on work, right, adjust clamp arm to parallel position with hand wheel as above

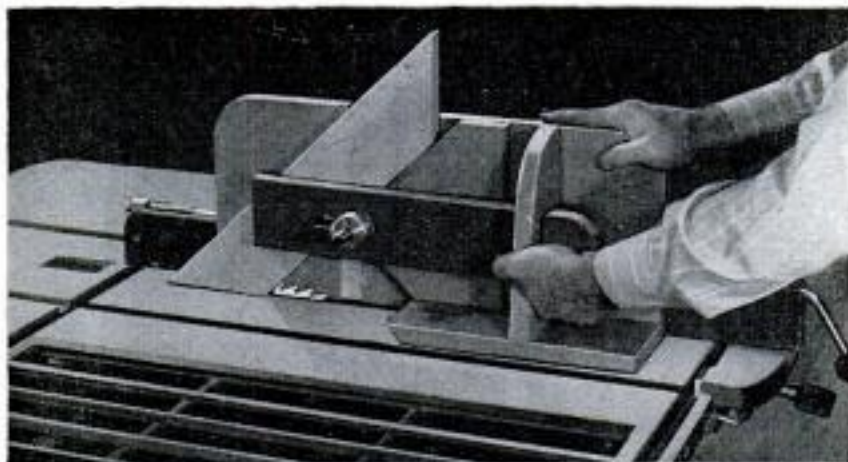


LEVER-ACTION TENONING JIG

By Sam Brown

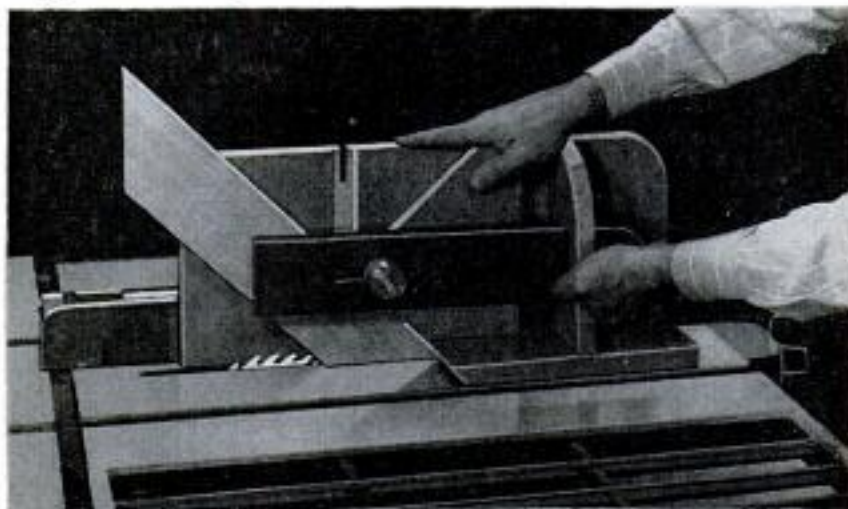
A TENON JOB on the circular saw requires the accuracy of a jig which provides for clamping the work firmly in a vertical position while the cuts are being made. The jig pictured above and below and detailed at the right consists of a right-angle frame made by joining two selected pieces of hardwood stock edge to face with screws and glue. The longer vertical member is grooved and slotted for the backstop as detailed. The 45-deg. angle plate, cut from hardwood, is glued and screwed to the face of the vertical member with the forward end flush with the edge of the backstop groove. When the angle plate is





When cutting tenons or grooving ends of stock mitered at 45 deg., backstop is removed. Photo above shows first grooving operation for spline

In the second position, toe of miter bears against base piece, or shoe, of jig. When cutting tenons, run shoulder cuts first on each end of stock



used backstop is removed for clearance.

When these three parts have been fastened in position, a brace is fitted as in the detail. The brace is mortised through to take the free end of the arm. Note that the brace is grooved to house a nut between it and the vertical member. The latter is drilled at this point with an oversize hole to take a $\frac{7}{16}$ -in. cap screw. The hole is continued through the brace into the mortise. Note also that the vertical member is counterbored to $\frac{1}{2}$ and $\frac{5}{8}$ -in. diameters near the end of the angle plate. The counterbore is made about $\frac{1}{4}$ in. deep which is sufficient to seat the inner end of the spring on the $\frac{1}{2}$ -in. clamp bolt holding the clamp arm. The free end of the clamp arm bears against the end of the bolt passing through the brace into the mortise, the bolt providing an adjustment for keeping the arm parallel to the work. Note in the detail that the clamp arm is slotted $\frac{5}{16} \times 2\frac{3}{8}$ in. so that it can be shifted to accommodate work of varying widths. Note also that the clamp arm is kerfed across the end with a band-

that it is parallel, or very nearly parallel, with the vertical member of the jig. This is done by tightening the bar lightly on the stock with the clamp wheel (a $\frac{1}{2}$ -in. nut may be substituted for the clamp wheel shown). Then adjust the arm with the cap-screw that bears against its free end as in the upper left-hand photo on the preceding page. In this view the cap screw has been fitted with a small hand wheel. Saw kerfs run in the back face of the vertical member of the jig as in the upper and lower left-hand photos on the preceding page will prevent it from warping. ★ ★ ★

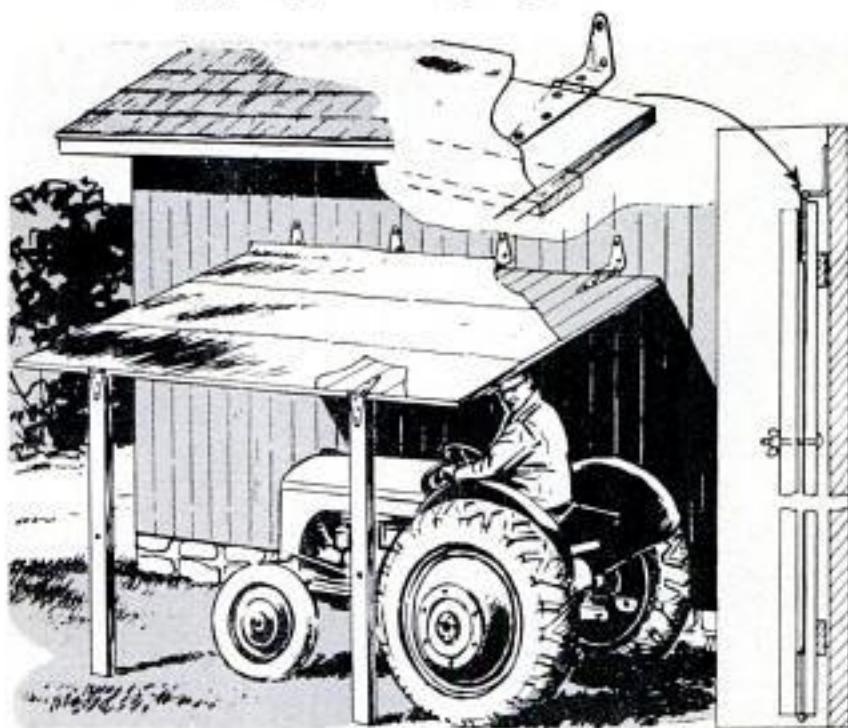
Securing Temporary Wire Fencing

To simplify the job of putting up and taking down a temporary wire fence, use slats, such as wooden lath, nailed over the wire at each post instead of staples. Attached to the post with only two or three nails, each slat can be pried free easily with a crowbar to remove the wire.

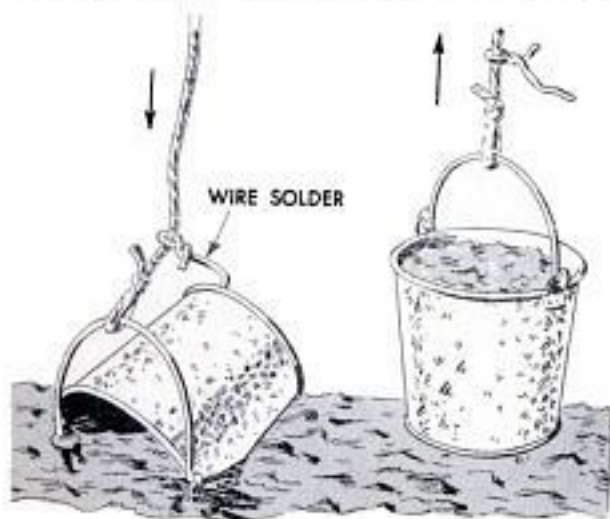
Ted Otsu, Vancouver, B. C., Can.

Desiring shelter for his tractor without the cost of constructing a permanent building, one farmer borrowed the idea of the modern carport, but improved on it by making a "tractorport" that folded. One side is hinged to an existing building, such as the barn, and the other side is supported by two hinged posts, thus allowing the shelter to fold flat out of the way when not in use. The posts are held against the shelter by long bolts when it is folded, as shown in the detail. Shingles or roofing paper are applied to the top surface to prevent leaks in rainy weather. This shelter also is easily transported when moving to another farm.—Ervin L. Strayhorn, Beebe, Ark.

Low-Cost Hinged "Tractorport" Stores Simply by Folding Against Barn Wall



Wire-Solder Hook Assures Submerging of Pail in Cistern



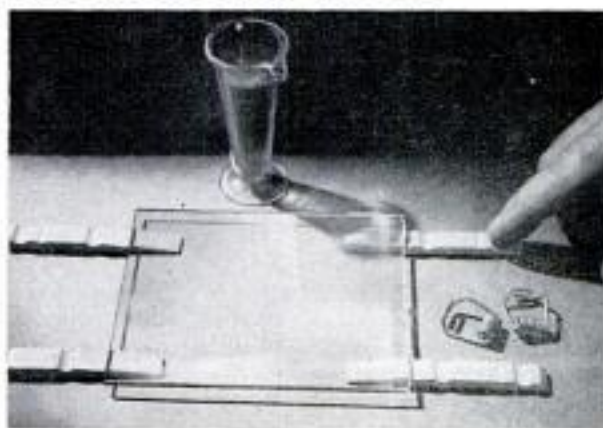
The difficulty of submerging a pail to fill it when dropped into a deep cistern may be overcome by using a hook made from wire solder. One end of a length of solder is twisted into a loop around the pail rope. The other end of the solder then is bent to form a hook which will catch the flange on the bottom of the pail. The hook is shaped to hold the pail so the top will enter the water first. As the pail fills with water, its weight will pull it down, and a quick tug on the rope will straighten and release the hook. The filled pail then may be lifted. The wire solder can be reshaped an indefinite number of times without breaking. Do not kink the solder, but make a gentle bend when forming the hook.

Clothespins Provide Leveling Wedges for Resilvering Mirrors

One shop that specializes in resilvering mirrors has found that the halves of spring-type clothespins provide excellent wedges for accurate leveling. The clothespin halves are all of the same size and shape and thus can be interchanged. As shown, the glass is being leveled preparatory to flowing the silvering solution over it.

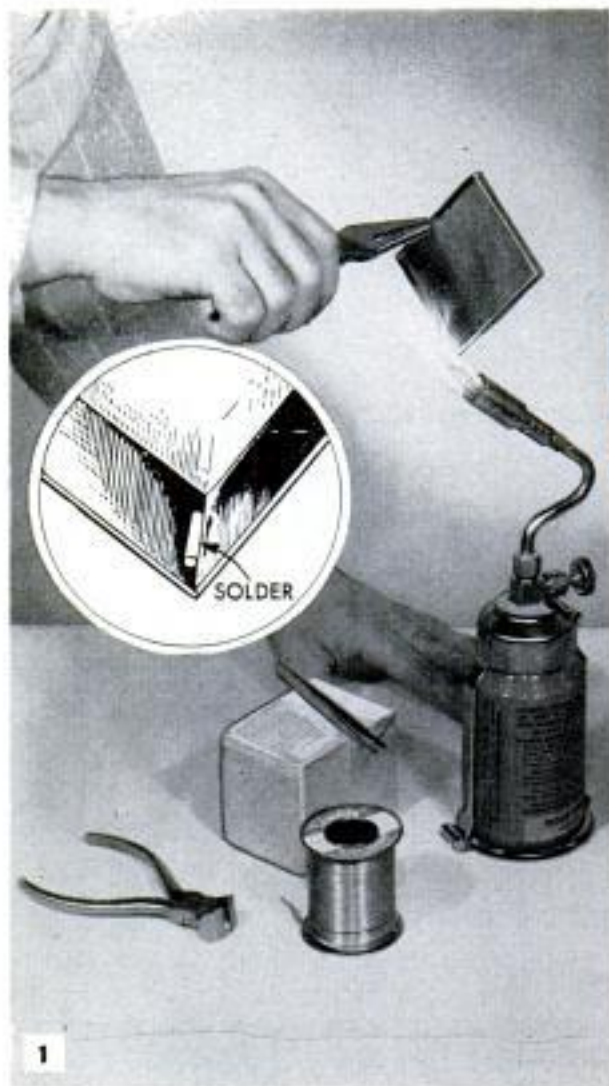
Ken Murray, Colon, Mich.

☐ For complete maintenance of an automobile engine, occasionally snug-up on all the oil-pan bolts, to prevent an oil leak around the gasket.



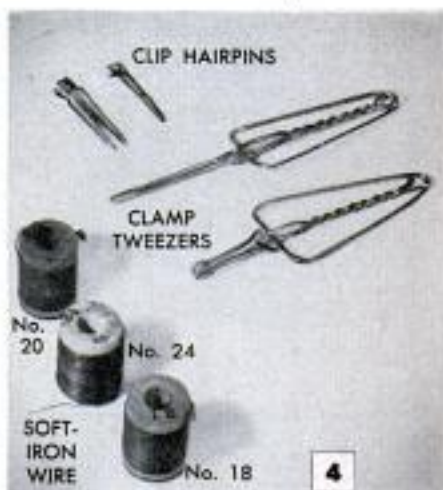
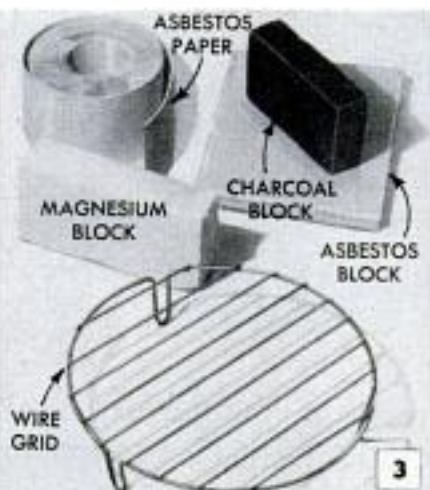
FLAME SOLDERING

By Sam Brown



FAST, CLEAN and invariably neat—that's flame soldering on all sheet metals that can be joined with solders, either hard or soft. On small units fabricated of light-gauge sheet metals the joint is formed almost instantaneously. This is always an advantage, especially when a number of small parts must be held in position with clamps or wire.

Equipment required: Soldering equipment for ordinary work is pictured in Figs. 2, 3 and 4. The torch, Figs. 1 and 2, utilizes fuel which is supplied by a detachable pressurized container. Good flame soldering also can be done with an acetylene torch, a Bunsen burner or even a candle. The handiest soft solder for average work is that in the $\frac{1}{16}$ -in. wire form in the 60-40 grade, melting at about 370 deg. F. A 50-50 solder melting at 400 deg. also is practical on certain types of work.



1. FLAME SOLDERING is done with torch of the type furnished with a detachable pressurized container supplying fuel in liquid form. Good flame soldering also can be done with an acetylene torch, a Bunsen burner and even with a candle on light metals

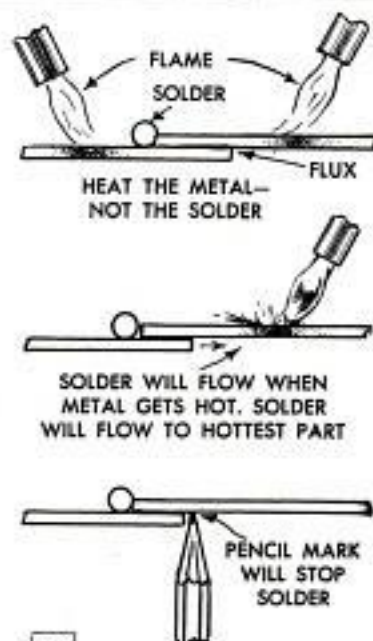
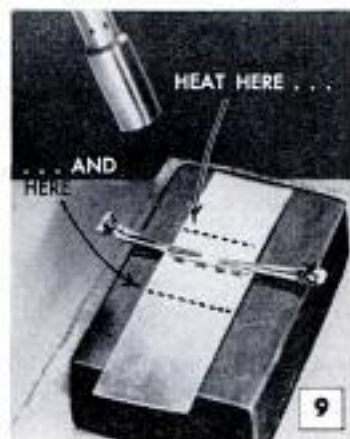
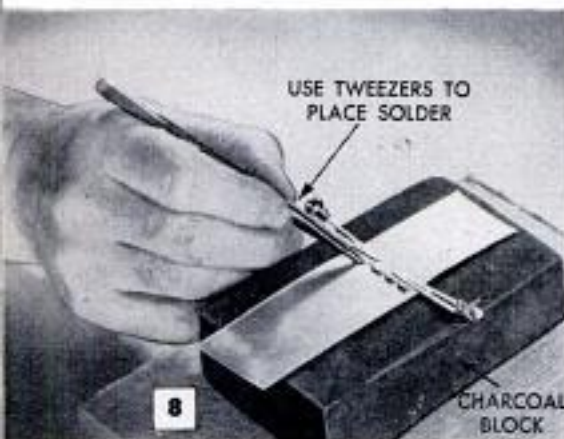
2. BASIC EQUIPMENT includes torch, solder and flux. Solder in $\frac{1}{16}$ -in. wire form in 60-40 grade (60 percent tin, 40 percent lead) is best all-purpose soft solder. Melting point is about 370 deg. F. A 50-50 soft solder also is useful for certain types of work

3. WORK BASES for flame soldering vary according to the type of the work. They must be of asbestos, magnesium or other fireproof material that will reflect heat. Soft charcoal and magnesium blocks permit mounting work with small pins pressed into block

4. HOLDING DEVICES are clips, clamps and binding wire. Weights also can be used on certain types of work. Use only iron binding wire, as brass or copper wire will bond with solders. Clamping tweezers are usually best for flat work. Never use pliers as holders



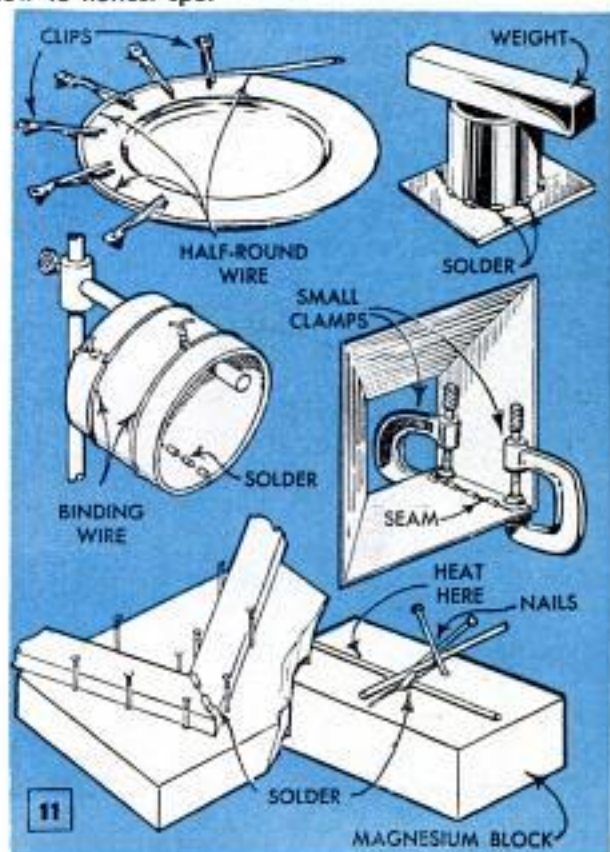
PRACTICE JOINTS will quickly acquaint the inexperienced operator with the speed and neatness of flame soldering. Flux the joint and place snippets of wire solder along the full length of it. Then heat the metal until the solder flows, or draws, into the joint uniformly

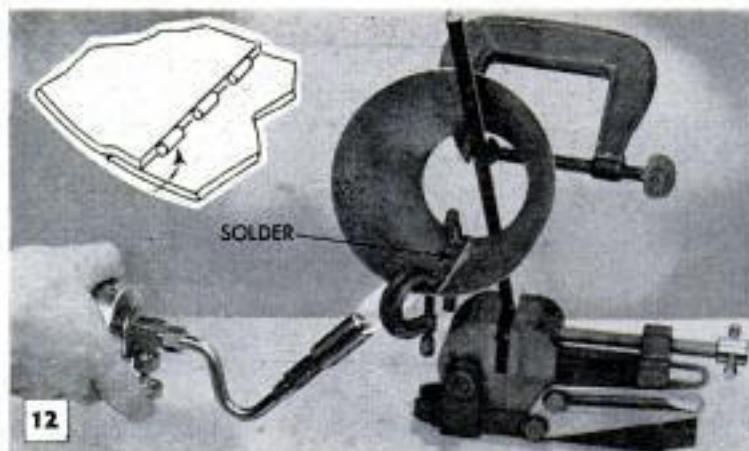


WHEN HEATING to form a soft-soldered joint avoid directing flame on joint or solder. Rather it is best practice to heat adjacent metal from below whenever possible. Keep flame moving continually as the heat is applied, to heat the metal uniformly as otherwise solder will flow to hottest spot

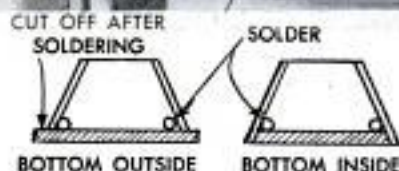
In all soldering, a flux must be used to clean the metal chemically and permit the solder to flow over it. The handiest of all prepared fluxes is that in the liquid form. This is an all-purpose flux and can be used on all metals except aluminum. On some types of work it is necessary to use a flux that will cling to vertical surfaces until the heat is applied. For these jobs, a paste flux is useful. Some users prefer, instead, a paste solder in which solder in granular form is combined with a paste flux. A non-flammable base on which to place the work is easily made by tacking a sheet of asbestos to a block of wood of the size required. However, professional work requires the use of magnesium, charcoal and asbestos blocks like those shown in Fig. 3. For some work, a wire grid is the thing. Several fire bricks also can be arranged to make a suitable work base. Never use iron, steel or other metals for work bases as these absorb heat so rapidly as to make soldering difficult if not impossible.

Lap seam: Figs. 5 to 10 inclusive show the steps in flame-soldering a lap seam. The first step is to cut $\frac{1}{16}$ -in. snippets from wire

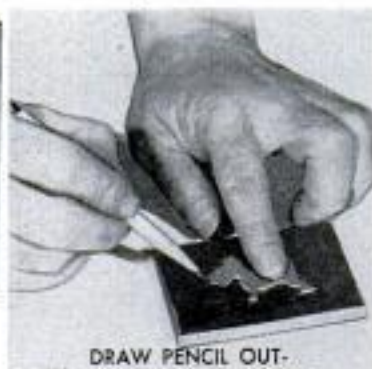




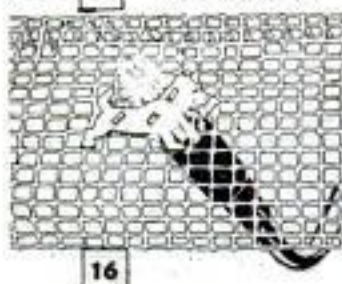
APPLYING FLAME from below permits uniform heating of metal while keeping flame away from the solder itself. Photo at right shows how a wet strip of asbestos prevents softening of solder in seam—already joined. When soldering bottom to cylinder or cone, bottom piece can be placed inside or outside



14 BOX LID WITH OVERLAY



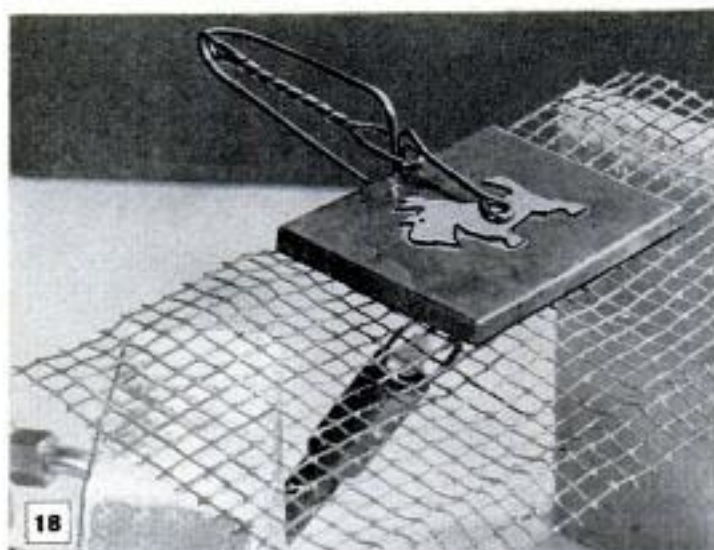
15 DRAW PENCIL OUTLINE AROUND CUTOUT



16 TINNING IS OPERATION OF MELTING COATING OF SOLDER ON WORK SURFACE



APPLY FLUX INSIDE PENCIL OUTLINE



18

solder. Then clean meeting faces of the parts with fine steel wool and apply a liquid flux, Figs. 6 and 7. Clip the parts together or hold down with a weight. Clips are preferable, Figs. 8 and 9. Place the solder snippets along the joint, leaving about $\frac{3}{16}$ -in. space between. Then apply the flame as in Figs. 9 and 10. As soon as the solder melts and flows, withdraw the flame. If you wish to stop solder flow at any point on metal, draw a pencil line at that point. In seam work and certain other operations it's a simple trick to "draw" the solder to any desired area by concentrating the heat at that point. Otherwise it is the best practice to keep the flame moving over the surface of the work so that the metal is heated uniformly.

Cylinder with bottom: Fig. 11 details several examples of work necessary when assembling sheet-metal forms. A rolled-up cylinder or cone with a bottom is typical. The seam is done first, Fig. 12, applying heat from below to draw the solder through the joint. The roll is held in place with soft-iron wire, Fig. 4, while the joint is made. Dampened asbestos paper is used to protect the finished seam when the bottom is soldered in place, Figs. 11 and 13. The bottom can be soldered inside or outside the cylinder or cone as in the detail below Fig. 13. Heat should be applied at the center of the bottom piece and slightly away from the side seam.

Sweat soldering: Figs. 14 to 19 inclusive picture a typical job of



19



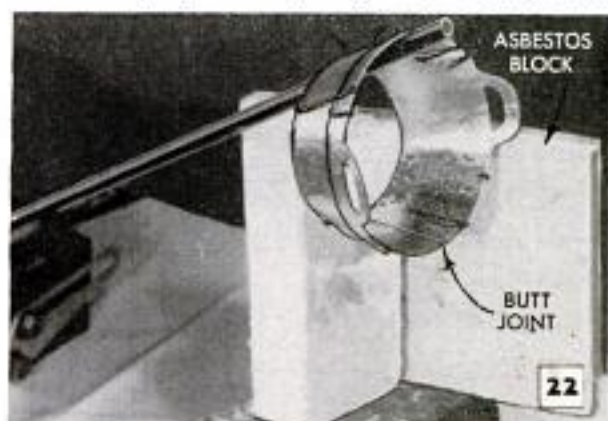
20



HARD SOLDERING is essentially the same procedure as soft soldering except that a much higher heat is required, up to 1600 deg. F., to melt silver solders. Flux is made by mixing cake borax with water to make a creamy mixture. Metal must be brought to a medium-bright red and then flame is played directly on joint until solder melts

sweat soldering. Sweating is used where it is desirable to prevent flow of the solder beyond the edges of the joint. First mark around the metal cutout with a lead pencil as in Fig. 15. Then flux the back of the cutout and place it bottom side up on a wire grid as in Fig. 16. Place three to five snippets of solder on the surface, arranging them so that when the solder flows it will cover the surface uniformly. Apply flame from below, moving the flame back and forth or with a slight circular motion to melt the solder uniformly. This operation is known as tinning. Next, apply a paste flux inside the pencil outline as in Fig. 17, making sure that none of the flux extends beyond the pencil line. Then clip the cutout in position and apply heat from below as in Fig. 18. Withdraw the heat when a thin, bright line of molten solder appears at the edges of the cutout. For exceptionally strong joints that must withstand appreciable strain, both parts of the work should be tinned. Small parts also can be sweated together without tinning by using a prepared paste solder.

Hard soldering: Hard soldering is essentially the same process as soft soldering except that the solders used have much higher melting points. Alloys containing silver and brass are used as solders. Silver solders are available in both the sheet and wire forms. Brass hard solders are usually available only in the sheet form. Figs. 19 to 23 inclusive show the process and the equipment needed. Hard solders melt at from 1300 to 1600 deg. F., and for this reason an air-acetylene torch is recommended, as it takes a bright-red flame approaching yellow to melt silver solder effectively. Solder in the sheet form is cut into small squares, about $\frac{1}{16}$ in., as in Fig. 19. The parts to be joined are first fluxed with a mixture of stick borax and water. This is



22



23

Charcoal block to which work is wired does not absorb heat in soldering bottom of bucket in place. Asbestos-covered wooden block may be used instead

made as in Fig. 20 simply by rubbing the borax stick on a piece of slate which has been wet with water. After fluxing and placing the particles of solder, heat from below until the metal comes to a medium bright red, then play the flame directly on the joint and solder until the latter melts and runs. Joints must be prefitted as silver and brass solders will not bridge gaps. When possible, use asbestos or charcoal blocks as in Fig. 23 to aid in concentrating heat. Hard-soldered joints will withstand severe strains such as hammering, spinning or other mechanical work. ★ ★ ★

Generator on Power Mower Runs Hedge Clipper



A commercial gardener often encountered the situation of being too far from an electric power source to run his electric hedge clippers. He solved the problem by installing a small 5-amp., 110-volt, A.C. generator on his gasoline-powered lawn mower. After he has finished cutting the lawn and is ready to trim the hedges, he slips off the drive belt of the mower and runs it over the pulley on the generator. With this arrangement, he is independent of the need of an electrical outlet and may run the clippers wherever convenient.

Seed Germination Percentage

The germination percentage of seeds can be determined easily by first punching small holes in a piece of insulating board and forcing a seed into each perforation. Then place the board in a shallow pan containing water. Add sufficient water from time to time to keep the insulating board damp. Percentage can be figured from the number of sprouts.

Test Innertube for Tiny Leaks With Aid of Hand Wringer

To simplify detection of tiny "spook" leaks in car innertubes, one garage attendant dips the partly-inflated tube in water and then runs it between the rollers of an old hand wringer attached to the side of the testing tank. This compresses the air in the tube sufficiently to cause small bub-

bles to appear over the defective area. It's a good idea to run the tube between the rollers several times, changing the starting point each time so that all areas of the tube are subjected to high pressure. The leaks then can be marked and repaired with a patch in the usual way.

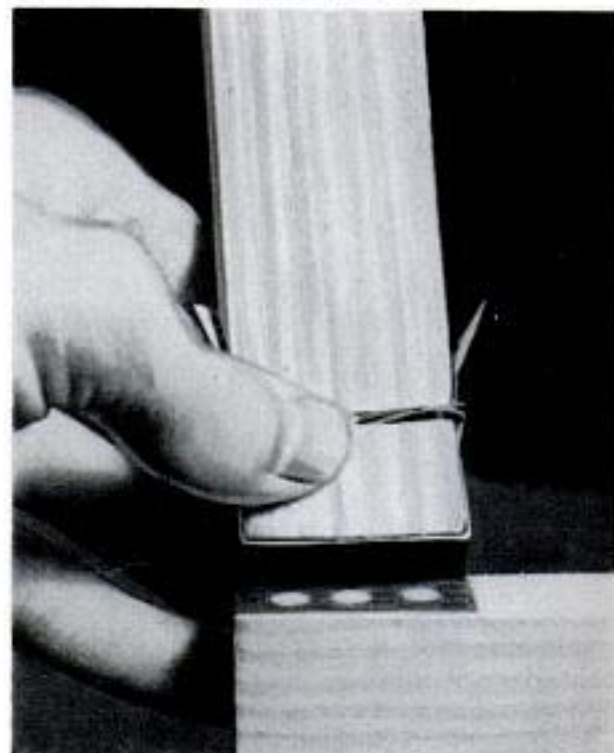
Accurately Aligning Dowel Holes Requires Only Carbon Paper

Requiring only a strip of ordinary carbon paper and a rubber band, this idea eliminates the problem of aligning dowel holes in two pieces of wood. First, drill the required number of holes in the end of one of the pieces to be joined. Then fasten a strip of carbon paper on the drilled piece so that it covers the holes. A rubber band will hold the paper and allow you to keep both hands free. Place the two pieces together in the exact position wanted. Give the drilled piece one sharp tap, and the impression from the carbon paper will give location of the dowel holes.

C. L. Barber, Dowagiac, Mich.

Keeping Water Warm in Pail

To keep a pail of water warm for outdoor use during cold weather, set it inside another pail in which a hot brick has been placed. If desired, two bricks broken in half to fit the bottom of the outer pail may be used to keep the water warm for a longer period.

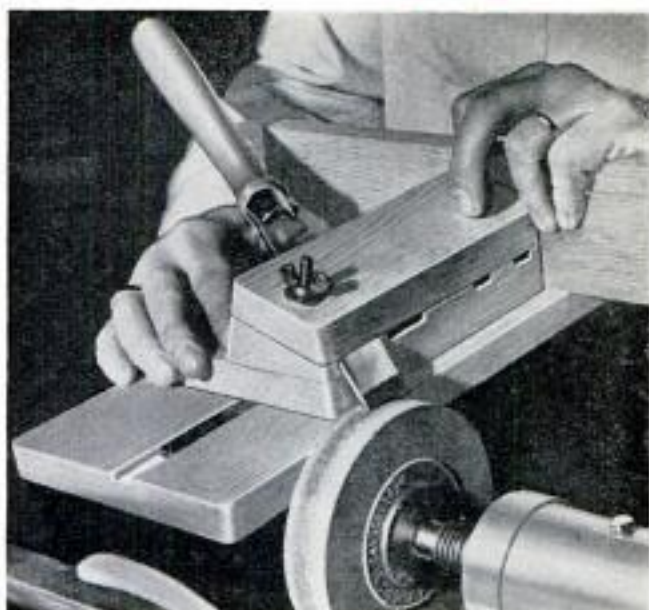


GRINDING JIG for lathe chisels

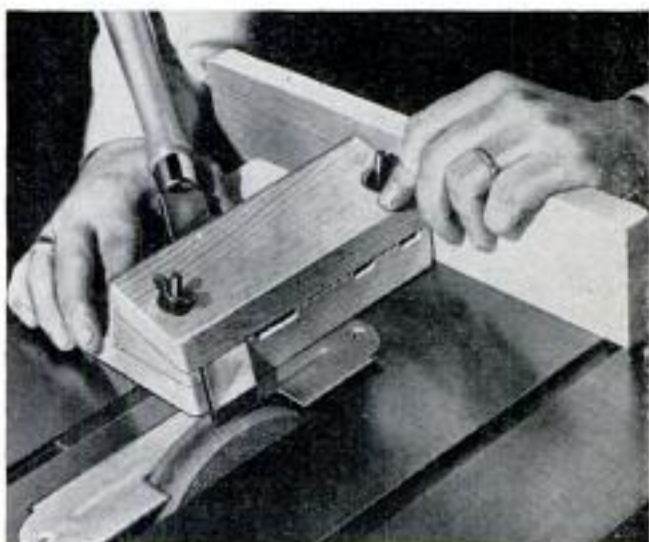
Leo F. Bowler, Jr.

EVEN EXPERIENCED hands have some difficulty holding the edge of a wood-turning skew chisel to a true bevel when grinding. Some variation is permissible on other lathe chisels but edge bevels on the skew chisel and gouge must be ground accurately. Of the two, the skew chisel is the most difficult to grind correctly freehand and as it is a true cutting, or paring, chisel, the degree of the included angle at the edge is important. A simple jig, made from hardwood as in the details below, does the trick. With only a slight change it can be used either on a circular-saw table, as in the center photo, or on a lathe sanding table, as in the upper photo. In either case, the jig is guided by a hardwood strip screwed to the base piece that slides in the miter-gauge grooves in the saw table and sanding table. The tool holder is inclined at an angle slightly over 17 deg. and the grooves cut into its face give the 30-deg. angle at the cutting edge. The grooves are cut to two widths to accommodate different sizes of skew chisels. Note that the grooves intersect at the center of the holder block so that each size of chisel can be turned over to grind the second bevel. Depth of the grooves is slightly less than the thickness of the chisel blade so that the clamping block will hold it firmly.

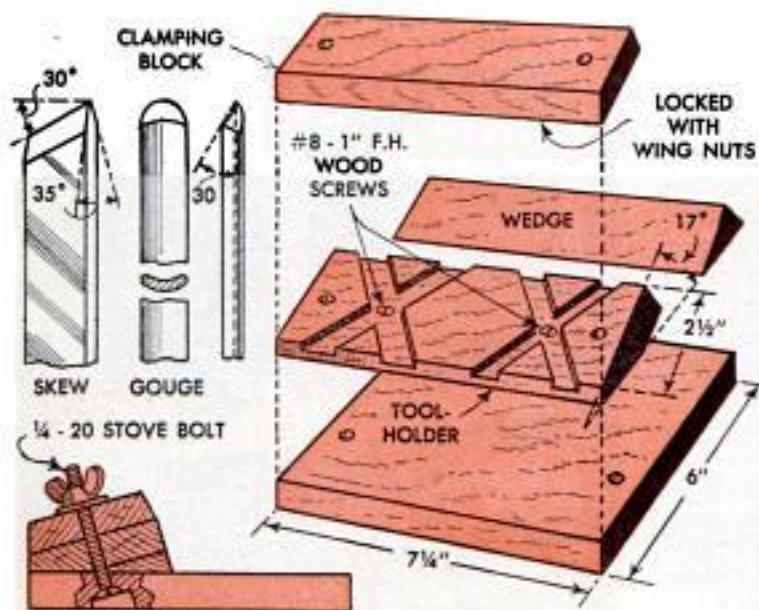
Except when reshaping the bevels on a damaged chisel, use a fine-grade grinding wheel, No. 80 or 100. In grinding, set the wheel to take successive light cuts on both bevels. This is done by adjusting the height of the saw arbor, center photo, or adjusting the sanding table as in the upper photo. The gouge is ground freehand as in the lower photo. Simply hold the tool as shown and roll it slowly from side to side.



Jig set up on a wood lathe with grinding wheel mounted on lathe spindle. The grinding jig slides on the lathe sanding table, guided by a hardwood strip



Above, same setup on the circular-saw table. Wheel is adjusted for height by raising saw arbor. Below, gouge is supported on table and rolled freehand





Inking Device on Pantograph Utilizes Refill Cartridge

When mounted on a pantograph, a ball-point pen refill will provide an ideal inking device that glides smoothly in any direction. Simply wind a turn of cellulose tape around the reservoir as shown to hold it in place. The pen refills may be purchased at most drugstores, department and variety stores where fountain pens and supplies are sold.—Frank Shore, New York City.

Hanging of Meat in Smokehouse Speeded by Using Hog Rings



To avoid having to cut and tie twine for hanging hams and bacons in his smokehouse, one farmer simply clinches a hog ring into each piece so it can be slipped over a hook as indicated. In this way, the pieces not only are hung securely but also can be removed easily for testing or storing. Natural oils in the meat prevent the rings from rusting.

securely but also can be removed easily for testing or storing. Natural oils in the meat prevent the rings from rusting.

Machinist's Layout White

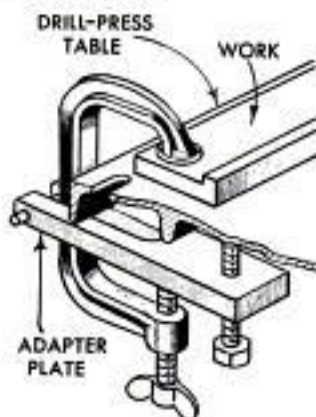
A mixture of painter's white-lead-in-oil and carbon tetrachloride makes a good layout paint for use on dark or rusty metal when no commercial product is available. Enough carbon tetrachloride should be

added to the paste white lead to make a very thin solution. The oil must be skimmed off after the solution is thoroughly mixed to assure rapid drying. The mixture is applied with a brush and dries immediately, leaving a flat white surface.

C. Wayne Close, Sycamore, Ohio.

Drill-Press Clamping Kink

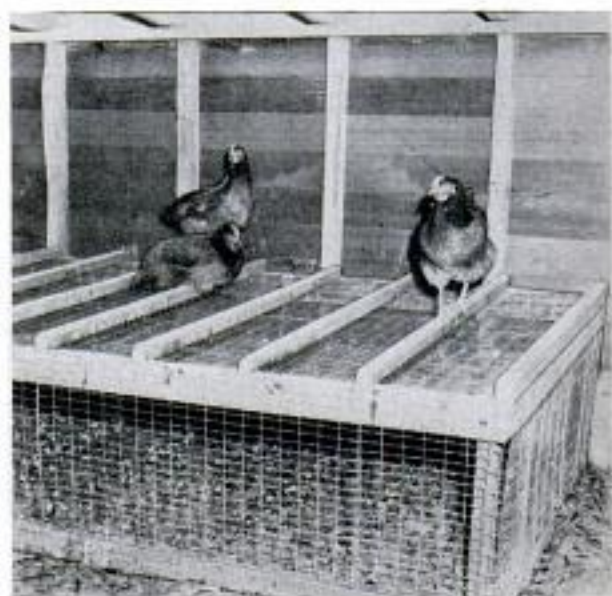
To provide a flat surface for the pad of a C-clamp on the underside of a drill-press table, one machinist uses an adjustable jaw or adapter plate in the manner shown. This consists of a steel bar slotted to receive the frame of the clamp at varying depths, a steel pin inserted crosswise through holes drilled near the end of the bar and a leveling screw installed at the opposite end. The pin holds the bar in place, while the screw is adjusted to make the bar level.



C. H. Willey, Penacook, N. H.

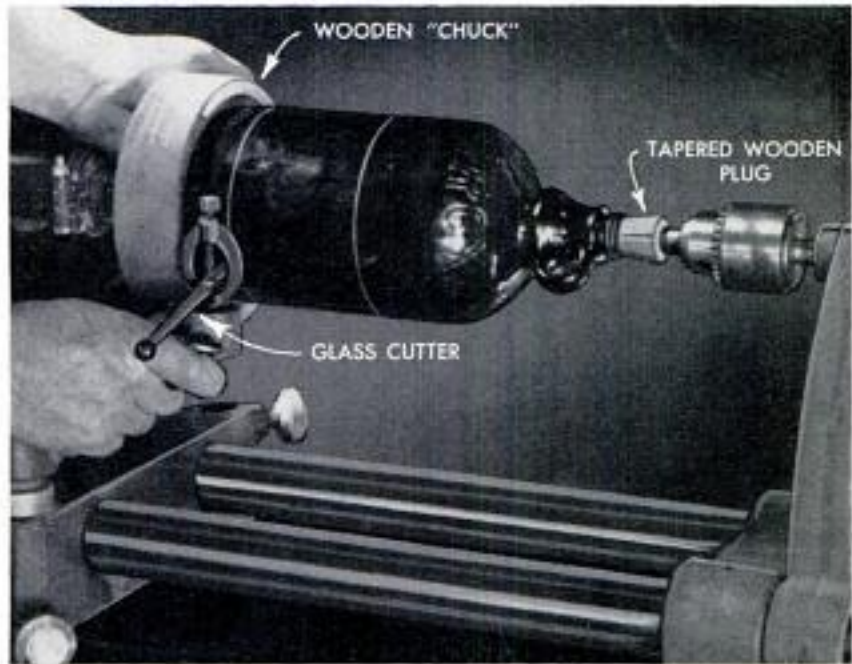
Frame Covered With Fencing Keeps Birds and Eggs Clean

Covered with poultry fencing, this light wooden frame keeps the birds and eggs out of the droppings. It is easily removed for cleaning. The back rail rests on lag screws projecting from the studding of the wall of the poultry house. Bolts instead of nails are used at the corners to keep the frame from twisting. The rails are 2 x 6s and the roosts are 2 x 2s with the tops rounded.



Glass Cutter Held in Lathe Tool Post Scores Bottles Accurately

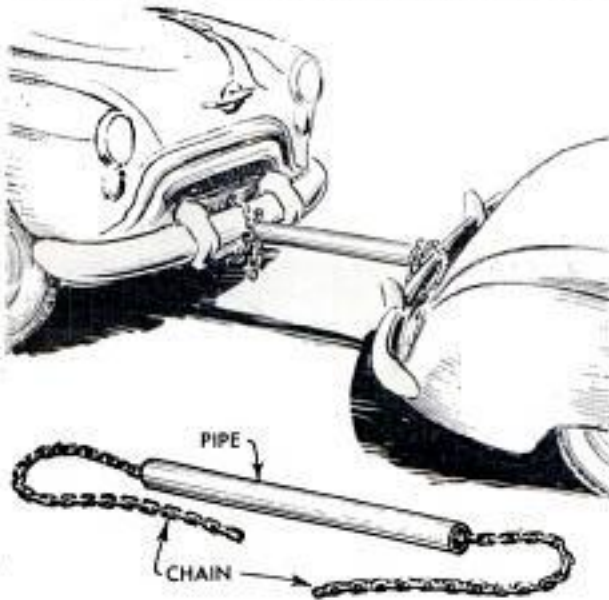
Cutting sections from colored glass bottles for use in making flower holders, spacers for built-up lamp bases and other novelties can be done accurately in a lathe. Mount the bottle between the lathe centers by using a cupped wooden faceplate for the bottom of the bottle and a tapered wooden "cork" at the other end. Mount a glass cutter in the tool post and adjust it to engage the bottle at a point about $\frac{1}{4}$ in. below the center line of the lathe. In some cases, a lathe dog can be used to hold the cutter as pictured. With the cutter engaged, turn the lathe one revolution by hand. If the cutter "skips" in places give the work one more turn. Wrap a small cord around the bottle at the score, saturate with alcohol and ignite. As soon



as the cord burns off, remove the bottle from the lathe and immerse in cold water. It will crack uniformly at the score.

W. G. Waggoner, Sacramento, Calif.

"Tow Bar" Is Quickly Improvised From Pipe and Chain



Combining the coupling advantages of a tow chain with the rigidity of a bar, this tow bar can be assembled quickly by any car owner. It consists of a chain threaded through a length of pipe. In use, connect the tow with a minimum of play between the ends of the pipe and car bumpers.

A. V. Malone, Los Angeles, Calif.

Handle for Carrying Vice

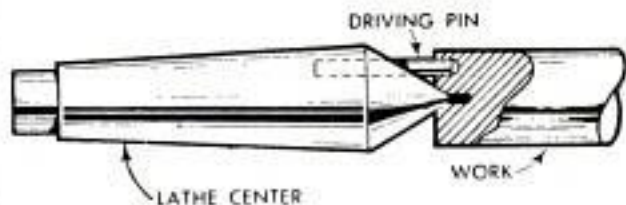
One way to make the job of carrying a heavy machinist's vise easier is to clamp the jaws on a 2 x 4 or heavy plank several feet in length. This will provide a handle that will permit two men to carry the vise between them. The handle is also helpful if the vise must be lifted or moved a short distance singlehandedly.

Warren H. Howe, Longview, Calif.

Lathe Center With Driving Pin For Machining Small-Diameter Work

Small-diameter work that must be machined its full length can be mounted between centers on the lathe and driven by a pin, which projects from the end of the live center. The pin is inserted into a corresponding hole drilled in the end of the work. This will eliminate the customary lathe dog, give better balance and allow much higher speeds to be used.

C. W. Woodson, Chicago.



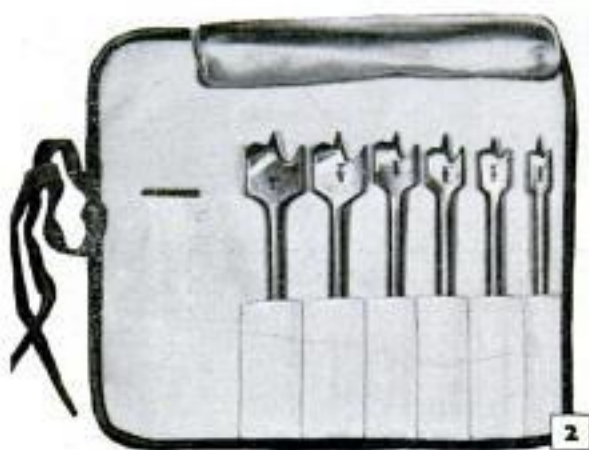
Clear lacquer provides a good coating to protect copper downspouts.



1

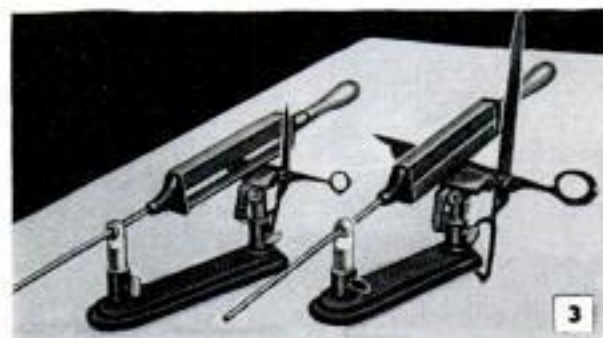
SHOPPING FOR TOOLS

1. RUST PREVENTIVE in crystal form gives off a harmless vapor which covers all surfaces within reach with an invisible film that prevents the formation of rust on metal surfaces exposed to high humidity. Items to be protected, such as tools, motors, are stored in drawers or paper bags with a quantity of crystals



2

2. WOOD-BORING BITS designed for use in portable electric drills have 120-deg. flats on the shanks to prevent slippage. Unusual shape of lip permits cutting edge to sever wood fibers cleanly, resulting in exceptionally smooth holes in hard and soft wood. Comes in four, six and nine-piece sets

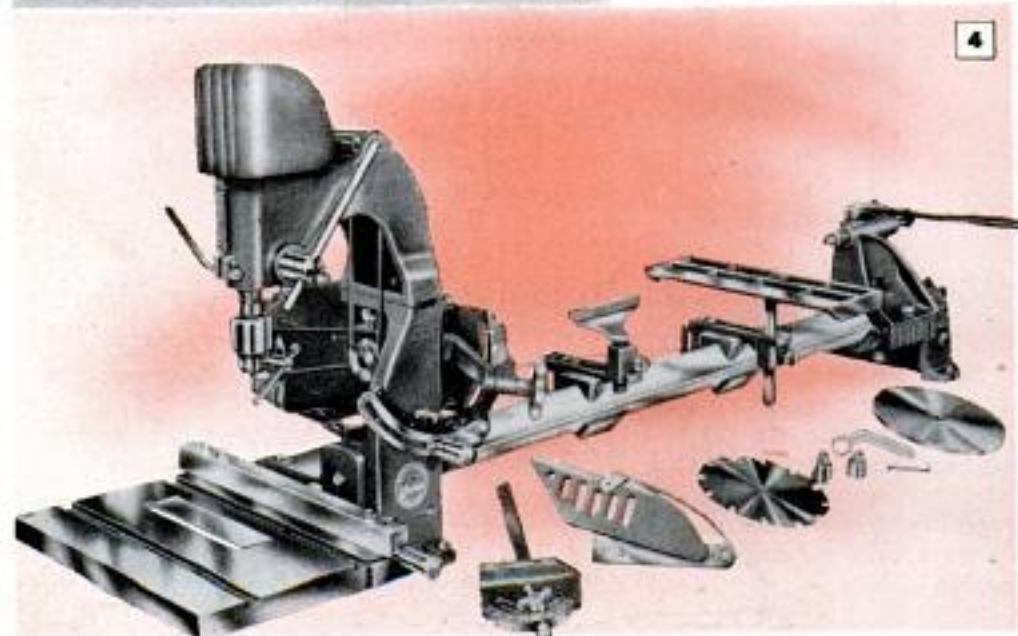


3

3. SCISSOR-SHARPENING JIG for hand-sharpening and honing scissors has a swiveling guide that takes care of the tricky business of maintaining a uniform bevel throughout length of edge. Holder is designed to mount two stones, one coarse and one fine, as in the illustration. Holder also takes a special short file

4. COMBINATION POWER SHOP can be set up as five power tools on a fixed base, the outstanding feature being a circular-saw unit having a tilting arbor for angle cuts up to 45 deg. Tailstock of lathe has 3-in. ram, or quill, travel with lever adjustment. Wood lathe swings 8½ in. and takes 32 in. between centers

5. SOAPSTONE "PENCIL" for welders, plumbers and others who make detailed layouts on sheet metal. Works like an automatic pencil and is designed to prevent breakage of the delicate soapstone "lead." The adjustments permit extending lead any desired distance and provision is made for locking it securely



4

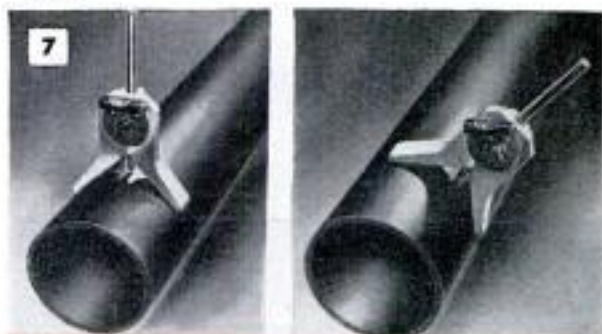


5

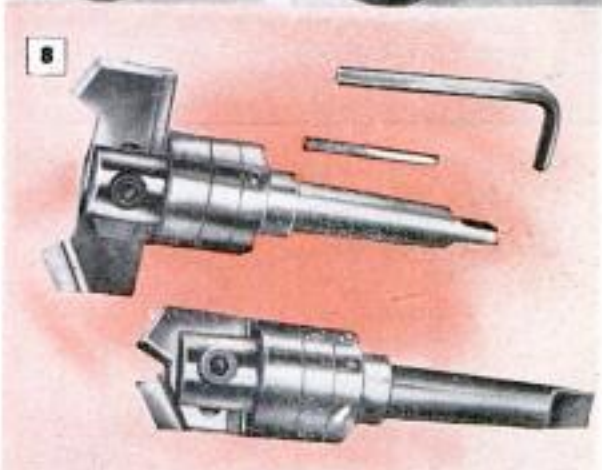
6. JIGSAW for hobbyist has a built-in motor which drives the blade direct through a rocker-arm mechanism. Cuts 1½-in. softwood. Table raises and lowers and tilts 45 deg. permitting full use of the blade throughout its length. Machine is equipped with a four-way blade holder so that it can be set to cut in any direction without interference from the frame when sawing long stock. Blade guard protects fingers



7. CENTERING PUNCH locates holes to be drilled transversely through round stock, pipe and tubing. Has a swiveling protractor head with scale and level which enables operator to set punch directly on axis of work as in left-hand photo or at an angle as in right-hand photo. Protractor head is of aluminum with accurately machined contact surfaces. Punch is ⅜ in. in diameter, has hardened and ground point

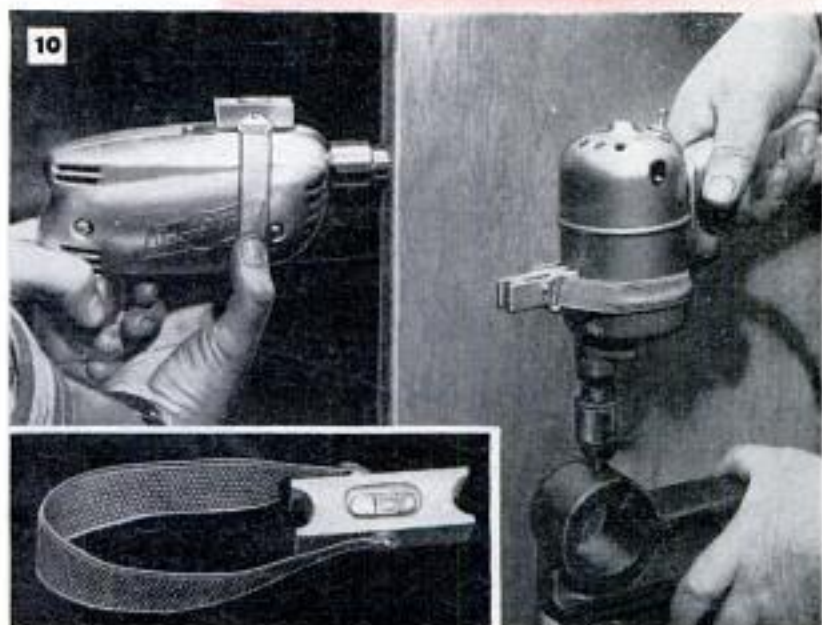
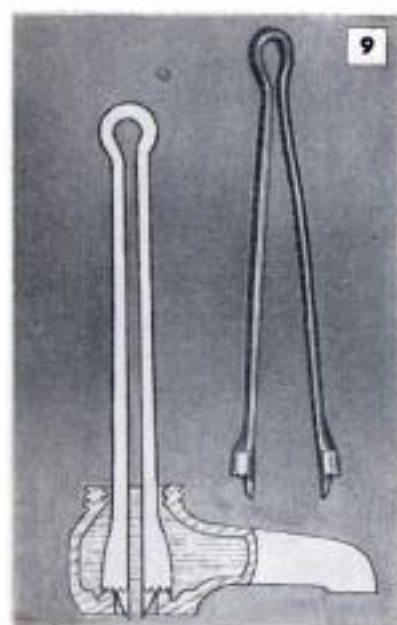


8. ADJUSTABLE DRILL BIT can be adjusted to drill oversize holes for clearance or undersize for press fits. Drills holes from 2 to 4 in. in dia. with two sets of blades. Top photo shows blades extended and lower photo pictures blades in retracted position. Shank is ground to No. 3 Morse taper for use in heavy drill presses, boring mills and turret lathes. Adjustment is made by turning a scroll ring on the body of the drill



9. FAUCET RESEATER is self-adjusting to faucet seats of various sizes. To use, simply remove the packing nut from the faucet, unscrew the stem and insert the reseater, pressing the arms tightly together so that the pilot, or guide, will enter opening below seat. Then press down firmly and turn in a clockwise direction. There are no separate cutters or other parts to lose as cutters are welded to arms forming handle

10. LEVELING ATTACHMENT for portable electric drills enables operators to drill straight holes either vertically or horizontally. Fits any drill and snaps into place with an elastic band as pictured. Eliminates that "blind spot" so familiar to operators of portable drills. Unit also has other uses. It can be used to level a camera on tripod and also comes in handy when leveling machines for special operations



SHOPPING FOR TOOLS

(Continued from page 219)



11. PORTABLE ELECTRIC DRILL has built-in light that focuses a bright beam on the point of the drill bit. Light is built into the gear housing below the drill chuck and the bulb has a vibration-proof filament. Puts light where you want it in those hard-to-see places. Eliminates inconvenience of light extension



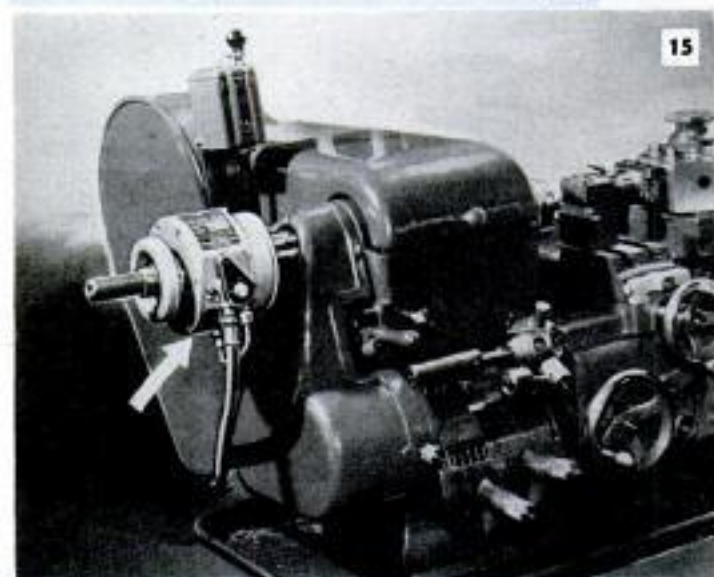
12. SPARK-GAP TOOL sets spark-plug electrodes with an accuracy that cannot be equalled by ordinary methods. Takes all standard plugs with gap specifications ranging from .022 to .040. Straightens the side electrode as it is set, thus assuring that the measurement is from the flat face and not from one edge



13. SELF-ADJUSTING PIPE WRENCH fits pipe from $\frac{1}{8}$ to $1\frac{1}{4}$ in. Single movable jaw is pivoted and special shape of work surface of jaw enables it to grip any size pipe within the normal range of sizes for which it is designed. Wrench cannot slip and score pipe when pressure is put on handle to tighten or loosen



14. FLEXIBLE DRIVE TOOL is available either as a screwdriver with conventional blade, or as a socket driver. Shank is flexible; permits driving screws or nuts at any angle up to 90 deg. with the axis of the handle. Gets into places where nut or screw cannot be reached with conventional types of drivers



15. COLLET CLOSER is air-operated to give nonstop lathe production on first or second-operation jobs. Adjusts automatically to slight variations in size of stock. Uses any standard draw-type collet and step chucks. Can be operated by hand or foot control, the latter eliminating hand operation entirely



16. HINGE-BUTT MORTISER utilizes a portable electric drill to supply power for the router bit. Consists of a router-bit guide and a jig, or carrier, which clamps to edge of door stile and to jambs as pictured. With the drill and guide in position, a simple movement cuts mortise to correct size and depth

Navy's new radio "Voice"

dedicated to America's security

**WORLD'S MOST POWERFUL MILITARY RADIO TRANSMITTER
A 6-YEAR NAVY-RCA PROJECT!**

On Jim Creek, in the State of Washington, stands the world's most powerful military radio transmitter—its giant antenna stretches from mountain peak to mountain peak.

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Speaking at the dedication ceremonies, Gen. Sarnoff, Chairman of the Board of RCA, said:

"May I express the wish, which I know all in our Armed Services share, that this powerful instrument for transmitting intelligence may add to our national security and to the peace of the world."

The first message flashed by the "Big Jim" transmitter was from Admiral Robert B. Carney, Chief of Naval Operations, to U. S. Navy personnel around the world. He said:

"With this message we forge another link between you and your homeland. With it, we build a new security channel from America to the naval units which form its outer ramparts of defense."



AT DEDICATION CEREMONIES—General Sarnoff operates key to transmit first message, dictated by Admiral Carney, to fleet units around the world.



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Choosing the right projector for your family color shows

IF you're a color slide fan—or about to be—you know that color slides are rewarding for yourself and enjoyable for your family, too. Yet much of the pleasure you receive depends on the projection device you buy.

Projector, table viewer . . . or both?

Naturally, you don't need a high-powered auditorium-type projector for a small living room. And it takes more than the minimum-powered projector to do a job, say, in a large family recreation room. It's possible you'd be just as happy with a table viewer as with a large picture projected on a large screen. Many color slide fans have both—a projector for a family show, and a table viewer for "quickie"

showings or editing slides in the living room under normal light.

Get a demonstration

When your dealer demonstrates the Kodaslide Projectors and Table Viewers shown on the opposite page, you'll find they flood your color slides with brilliant light, even to the extreme edges of the picture. You'll see each detail crisp and clear, thanks to unique optical systems developed by Kodak optical engineers. And slide changing is easy—even in darkened rooms.

Your Kodak dealer is there to help

Talk with your Kodak dealer about your personal needs—have him demonstrate—and you'll find it's easy to choose the right slide projector or viewer.



Kodaslide Highlux III Projector—Has a brilliant optical system, powerful 300-watt lamp; gives new life to your color slides. Quiet motor-driven blower cools slides. New-type slide feeder in top prevents jarring instrument when changing slides. \$56.50. Highlux II is 200-watt model without blower. \$36.50.



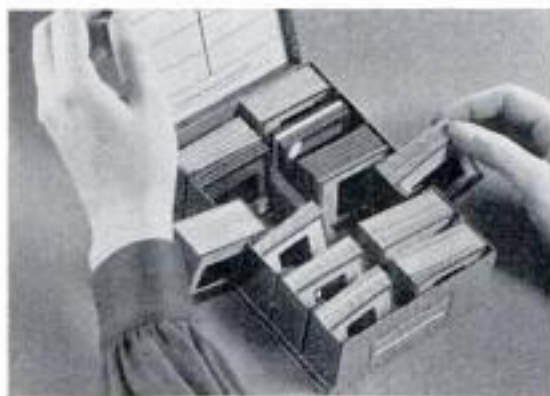
Economy projector—Kodaslide Merit Projector shows your slides with bright, even illumination. Aluminum baffles keep slides cool. Built-in elevation device, easy to operate. Slide-feeding on top prevents jarring instrument. Includes fine Kodak Projection Ektanon Lens, 5-inch $f/3.5$. \$24.65.



For small group showings—Kodaslide Table Viewer 4X combines projector and screen in one handy unit. Enlarges color slides more than 4 times, shows them brilliantly even in lighted room. Only \$37.50.



Deluxe viewer—Kodaslide Table Viewer, Model A, has Day-View Screen for brilliant images. Takes 75 cardboard or 30 glass slides. Push-pull changer advances slides, turns light on and off, restacks slides. \$97.50.



Easy way to store slides—Kodaslide Compartment File has 12 handy swing-out compartments. Stores 240 cardboard or 96 glass slides. You'll appreciate the handy index inside cover for subject reference. \$3.94.



New file for an evening's show—Kodaslide Ready-File is compact, handy for carrying. Holds 200 cardboard 2 x 2 mounts or 100 stereo cardboard mounts. Keeps slides in groups, the way you project them. Index in cover. \$1.95.

Prices are list, include Federal Tax where applicable, and are subject to change without notice

Eastman Kodak Company, Rochester 4, N. Y.

Kodak
TRADE-MARK

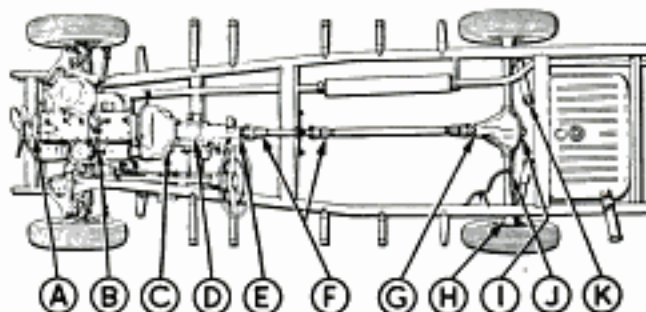
Care and Feeding of Engines



BY
S. P. CORP

LOOKING FOR OIL LEAKS

After a long cold winter, gaskets may shrink, bolts may loosen, oil may leak on your garage floor. It is important to locate these leaks and correct them.



- A. May require a new timing chain oil seal or new oil pan gaskets.
- B. New oil pan gasket.
- C. If engine oil, a new rear main bearing oil seal may be needed. If oil is black and heavy, you may need a new transmission front bearing oil seal.
- D. Transmission oil leaking here may call for a new transmission cover gasket or a new speedometer drive gear oil seal.
- E. Transmission oil here calls for a new transmission rear bearing oil seal—also indicated by oil thrown across the under side of the car body.
- F. You may need to replace the U-joint rubber boot.
- G. Oil leaking from front of rear axle calls for replacing the pinion shaft bearing oil seal.
- H. When inside of wheel is covered with axle oil, the outer end of the axle oil seal needs replacing, lest it cause brakes to grab, which is dangerous.
- I. May require rear axle inspection cover gasket, or merely tightening the plug. If filler plug ferrule is loose in housing, spot welding is needed.
- J. Rear axle oil leaking at hydraulic brake fitting may call for removing brake liner and tightening or replacing fitting; then bleed brakes.
- K. Oil leaking from shock absorber usually calls for replacing the whole sealed unit.

Watch for oil leaks and correct them, as oil can cause costly damage on parts where it doesn't belong.

YOURS FOR THE ASKING



Write for your free copy of the helpful illustrated manual, "MORE POWER, Less Gas, Less Oil." It may save you real money. And when you re-ring, insist on Sealed Power KromeX Ring Sets, with chrome top compression ring, chrome rails on oil ring, and the famous Full-Flow Spring. KromeX Ring Sets are factory-seated for fast break-in and immediate oil control. Sealed Power, Dept. G-3, Muskegon, Mich.

Sealed Power

PISTON RINGS

Clinic for Homemakers



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Sawdust Insulation



Q—I'm planning to build a new home of frame construction with outer walls sheathed and clap-boarded and inner walls lathed and plastered. I want to use sawdust and planer-mill shavings as insulation. However, I'm troubled about the problem of the insulation settling in the walls leaving a space unprotected. How is this prevented?

—G. B., Ore.

A—We cannot recommend the use of sawdust or shavings as insulation in walls. As you have anticipated, the material tends to settle into a compact mass having questionable insulating properties. It also tends to collect moisture, causing rotting of the framing members of the structure. When damp, it does not dry out readily. Although the initial cost of sawdust-shavings insulation may be attractively low, we think that in the long run it will pay you well to discard the idea entirely and use an approved insulating material. This can be one of the batt, quilted or foil type, whatever you choose as being the most convenient to install. We'd suggest that you consider using a batt-type insulation having a vapor-seal facing which is placed on the room side of the wall at the time of installation.

Puttying Sash

Q—A year or so ago I re-puttied the window sash in my home. I allowed the putty to dry two weeks before the sashes were painted. Now the putty is loose in several of the sashes and some of it has fallen out, exposing the glass and also bare wood. The putty strips hardened but did not seem to adhere to the wood. What is the cause and how can I remedy it?

—J. F., Va.



A—Are you sure that the wood was thoroughly dry when the putty was applied? This is such a common cause of the trouble you describe that we are raising the question. It is essential that the wood be dry. Also, it is advisable to prime the wood with paint or linseed oil after the old putty

(Continued to page 226)

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You'll call it "miracle flooring," too, when you see for yourself how rugged, durable MATICO Aristoflex shrugs off household acid, alkali and grease... stays new and sparkling looking with easy damp moppings. Biggest miracle of all is the price! Produced especially to meet the needs of homeowners everywhere, MATICO

Aristoflex is low in cost... gives you more for your money. And you can install economical Aristoflex in every room in your home... from basement to attic. See Aristoflex in 12 rich, clear colors at your MATICO dealer soon. You'll find him listed in your classified telephone directory.



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It's easy! Just mark a straight line through the center of your room in both directions, using a chalk and line. Be careful not to cover up your guide lines.



With a notched trowel, spread adhesive over one-half of your room at a time. leave only a thin coat of adhesive on the floor.



After adhesive becomes tacky, snap the tiles into place. Do not slide tiles or adhesive will push up between the tiles.



Here's the best part! Show your wife your handiwork. (Don't tell her what a cinch it is with MATICO's easy-to-follow instructions).

No Kitchen Odors

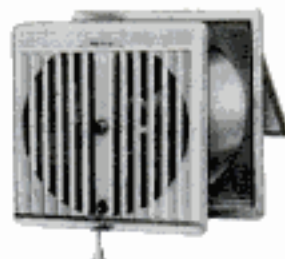
SINCE WE INSTALLED OUR

FASCO VENTILATING FAN



AT LAST, an end forever to those annoying cooking odors, messy greases and damaging vapors! Why, our kitchen is a breeze to keep clean . . . and so pleasant now with this beautiful Fasco Fan. . .

DO IT
YOURSELF
AND SAVE!

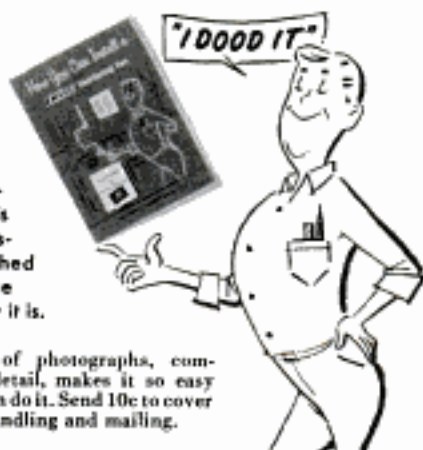


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(Continued from page 224)

has been removed. The primer should be thoroughly dry before new putty is applied. Be sure you have the putty worked to the proper consistency. It should "draw" easily under the knife but should be heavy enough to stay in place without sagging on vertical sash rabbets. Use sufficient pressure on the knife to force it under the edge of the glass pane. The new putty should dry for at least two weeks, preferably longer, before painting.



Reseeding Old Lawn

Q—Last year my lawn was patchy, infested with weeds and in some places moss appeared. The soil apparently is a hard clay and I have trouble getting new seed to root. I do not want to go to the expense of tilling and preparing the area for an entirely new seeding. Can I improve the present lawn?—C. Y., Kans.

A—There is much you can do to improve conditions for the healthy growth of the existing sod but, of course, you can hardly expect to achieve the perfect lawn. This first season set the mower as high as it will cut and continue to cut the grass at this height throughout the season. Soon after growth starts apply a complete lawn fertilizer which is combined with a weed killer. This should be applied with a spreader so that you get a uniform distribution. Several applications will be necessary at regular intervals to get all the weeds and stimulate growth of the existing grass. As the weeds are killed out bare spots will appear. Loosen the soil in these spots with a spading fork and seed heavily. Mix grass seed in with the fertilizer and weed-killing mixture at each application.

Crack in Foundation Wall

Q—There is a horizontal crack running nearly the full length of one wall in my basement. The wall is poured concrete and the crack is at approximately the same level all the way across. It has opened about 1/4 in. in places but so far as I can tell the wall has not tipped inward appreciably. Is there anything I can do to repair this defect?—H. B., Minn.

A—Of course, it is not possible to say with certainty, but we would guess that this crack will not open much more, if any. It undoubtedly was caused by pouring the wall in two stages, with a day or more elapsing between pourings. A crack of the type you have described usually results from this procedure. As a rule, it does not develop into a serious defect structurally, although there is the possibility of water seepage causing some trouble inside the basement. Probably the best treatment is to fill the crack with a masonry waterproofer. Mix a small quantity of this with water to form a fairly heavy paste. Force this into the crack with a putty knife or small trowel and then immediately smooth the material with a brush to conceal the appearance of a narrow patch.

Wood Paneling Over Masonry Blocks

Q—I want to panel an interior wall with knotty pine. The wall is built of light, soft blocks laid up in the same manner as concrete blocks. Can I nail the pine panels, or boards, directly to the blocks? Is there any danger of moisture condensation back of the boards?—S. L., Ky.

A—You can nail the pine boards directly to the blocks, as you suggest, but we think it would be better to nail wooden furring strips to the blocks and then attach the boards to the strips. On an interior wall there is little danger from condensation, but perhaps it is just as well to make doubly sure that no trouble occurs by applying asphalt building paper to the furring strips before nailing the boards in place. Some builders also would prime the backs of the boards with an oil-base paint before installation. Be sure that the furring strips are nailed tightly and that they are of a uniform height above the surface of the wall.

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Learn all about the advantages of New Moon mobile living—how you can enjoy complete living comfort and convenience in a New Moon mobile apartment home that is completely furnished and available in a variety of sizes to fit your living needs. This colorfully illustrated fact-packed book tells how you, like thousands of folks from all walks of life, can enjoy New Moon ownership at new low cost on our "like-rent" payment plan.

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CAMERA EXPOSED? Peeling leatherette on cameras, binoculars and other equipment can be mended like new with "Duco" Cement.



RIDING A HOBBY? Maybe you make toys, scale models—build 'em for the fun of it. Use fast-drying "Duco" Cement.



LEAKY AQUARIUMS call for quick, dependable repairs. A dab of waterproof, transparent "Duco" Cement seals leaks easily.



LEAKY TENTS can spoil camping fun. Waterproof, flexible "Duco" Cement seals tiny holes... prevents them from enlarging.



TORN BASEBALL MITTS can stay in the game longer when leather is repaired with strong, flexible "Duco" Cement.



CRACKED LENSES on flashlights will hold fast until they're replaced, when you mend them with transparent "Duco" Cement.



TORN WALLPAPER need not be a household catastrophe. Just mend it neatly, quickly with handy "Duco" Cement.



REPLACE FELT on bases of candlesticks, vases, and bric-a-brac—to protect finish of tables. Use Du Pont "Duco" Cement.



NEW EASY-SEAL TOP HAS HANDY APPLICATOR TIP



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

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The Sub That Can Lick a Plane

(Continued from page 126)

the only person looking through the periscope when the submarine is submerged and everything is dependent upon his judgment.

Skirting fishing fleets and diving from planes searching for him, the skipper "conns" the ship towards the assigned station. At last that day arrives and then comes a period of tenseness in which the radar picket must surface and establish contact with the carrier striking forces. The first thing that our submarine picket gets on his radar screen is an incoming flight of planes bent on destroying the task forces moving in.

Back in the air-control center, a room unique to pickets between the conning tower and the after-torpedo room, an operator spots the planes and speaks into a UHF or VHF set: "Bogies, seven or eight in number, bearing 045, range 40 miles, closing fast."

This information flows to the carriers of the task force and there orders bawl out: "Pilots, man your planes." Combat air patrols, hovering above the carriers, are already on the way to meet the attack.

The skipper of the picket hears this by monitor. The operator broadcasts his information direct to the task force without checking with the skipper. Time doesn't allow it. In the jet age, forty miles is only two "breaths" away.

The picket continues to broadcast information as she spots enemy air movement on her radarscope.

How can the radar picket fit into the total radar defense of the United States other than by her assigned role of watchdog for the operating carriers?

The answer, again, is simple. In event of future wars these stealthy boats could arrange themselves off an enemy coast and relay movement of high-flying aircraft back to the States. Since the broadcast range would necessarily have to be short, a veritable chain of these boats would be needed as a supplement to our coastal radar defenses.

The submarine has its greatest advantage in adaptability. It can now launch guided missiles. It has already proved its worth in plundering enemy shipping and in the humanitarian chores of pilot rescue and evacuation. It can drop frogmen close to enemy shores.

Now, a new role has been added in the radar picket. Subs were second best in fighting aircraft surfaced, but now the radar picket can lick a plane without even firing a shot.

★ ★ ★

Snap-Tite

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Fits beverage bottles

15c



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Fits regular ALADDIN vacuum bottles

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Fits ALADDIN wide-mouth 10-oz. vacuum bottles

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Fits THERMOS spoon-mouth bottles. In 10-oz., pt. & qt.

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No. 70

Fits UNIVERSAL and THERMOS pt. size wide-mouth food vacuum bottles

70c



No. 80

Fits ALADDIN wide-mouth pt. & quart vacuum bottles

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No. 75

Fits UNIVERSAL and THERMOS qt. size wide-mouth food vacuum bottles

75c



No. 79

Fits PICNIC JUGS

79c

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VACUUM BOTTLES
PICNIC JUGS
BEVERAGE BOTTLES**

Snap-Tite Adjustable Stoppers will save money for you by keeping food and beverages fresh, hot or cold longer — makes an air-tight seal. It's the easy-to-use adjustable feature that makes this possible. A twist with the fingers makes Stopper larger or smaller to fit size of opening. Ask your dealer for Snap-Tite or write.

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NAME _____

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How to Produce New Ideas

(Continued from page 106)

an attempt to send telegraph signals from a rotating disk—which he noticed gave a resonant hum at high speeds. In 1877 he developed a modified funnel through which vibrations of the voice operated a pawl and ratchet wheel. Tinkering with what seemed a useless toy, the inventor suddenly connected it with his disk experiments. Combining elements from the two devices, he came up with the talking machine. Had Edison not had a problem lying dormant, mere experiments with the voice funnel would not have led to the phonograph.

Creativity seems to depend upon a sudden fusion of elements already familiar in experience. An experiment in chemistry provides an analogy. Take a supersaturated solution of sodium thiosulphate and examine it; it has all the properties of a liquid and no characteristics of a solid. Drop just one crystal into the solution, and with a rush of molecules the entire solution will suddenly solidify in crystalline form.

Unsolved problems, stirred in the mental hopper long enough, tend to become supersaturated. When that stage is reached, introduction of a single pertinent new factor may cause crystallization or "inspiration."

Especially in the case of major originators, the number of new ideas produced is as startling as their range. Leonardo was almost equally proficient as a painter, mathematician, architect, engineer, sculptor, psychologist and physicist. He himself regarded his military work as equal to his works of art. Leonardo studied optics and devised a theory of three-dimension vision. He originated the science of hydraulics. Botany, anatomy, geometry and natural history vied for his time and attention. Yet his first major job was as a professional musician. He invented a rapid-fire cannon, a time fuse, harbor dredge, screw-cutting machinery, a diving bell and a rolling mill. He conceived of using the propeller for motive power and devised models of a submarine.

Ludwig von Helmholtz was a military physician, physicist, anatomist, mathematician and physiologist. His discoveries ranged from measurement of the velocity of nerve impulses to the principle of conservation of energy. He made major advances in electrodynamics, fundamentals of geometry, vortex motion of fluids, optics and philosophy. Printer-diplomat-writer Benjamin Franklin invented the lightning rod, bifocal glasses, the Franklin stove and a clothes mangle. He founded the public library system, the national postal service

(Continued to page 234)

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Gravelly does jobs other tractors won't . . . because Gravelly has that *extra* power you need for the tougher mowing, gardening, field and farm jobs. Does a better job, even on *steep slopes!*

You get *more* when you get Gravelly. All-gear drive, power reverse, simple operation. More traction from easy-handled, *balanced* weight. Power attachments quickly interchanged, *securely* mounted, with only four bolts!

See Gravelly's rugged, compact, completely functional design. Not merely assembled, but completely manufactured by specialists who make only Gravelly Tractors and their attachments.



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PLUS . . . 21 JOB-RIGHT TOOLS!

Your choice of 21 tools for a versatile tractor that saves time, work and worry *all year long*. Tools to do every mowing, gardening, field and farm job.

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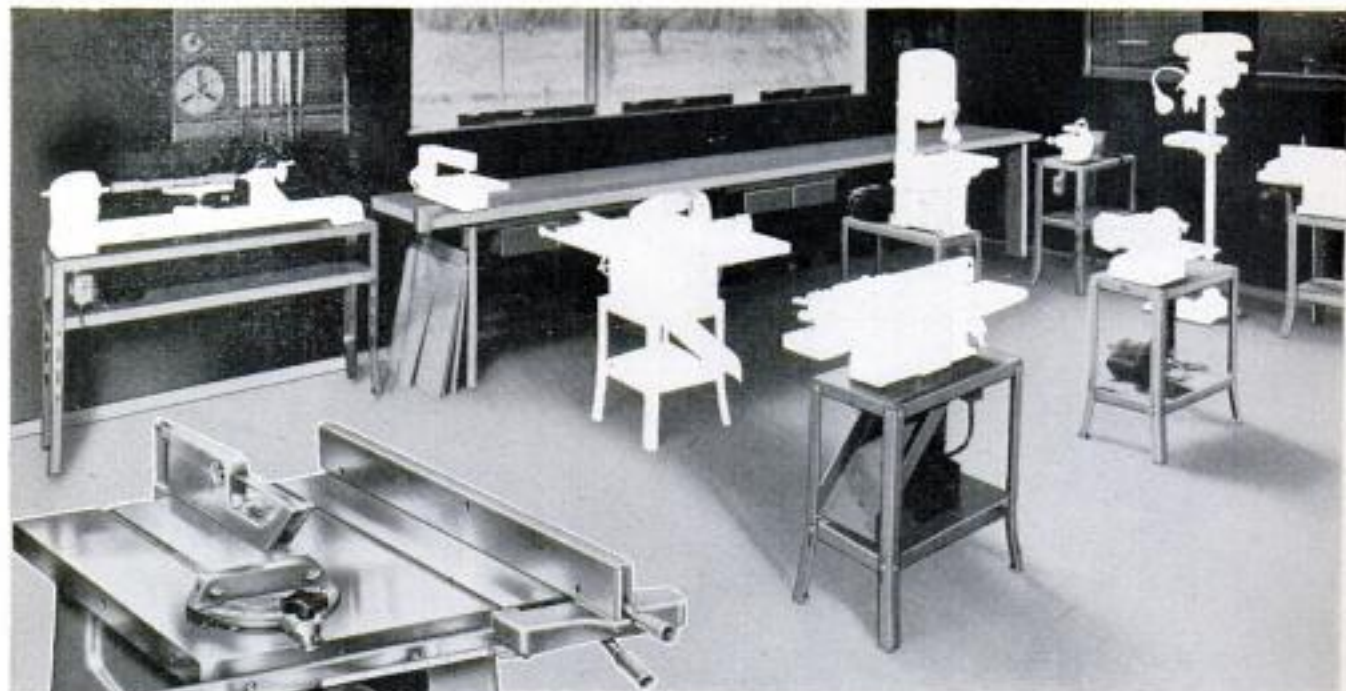
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Circular Saw**

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Even if you have a saw, you should see **THESE TWO GREAT NEW ATLAS TILT/ARBOR, BALL BEARING CIRCULAR SAWS... 8" No. 3021... 10" No. 3061**

They're brand new from top to bottom . . . the saws of tomorrow setting new shop standards today. **TEN NEW FEATURES** combine to make them more rugged, easier to handle, quieter, smoother and more accurate than any previous saws, at any price. Just look at these "plus values": **NEW** modern structural design . . . **NEW** push-pull dual blade control . . . **NEW** larger arbor and sealed-for-life ball bearings . . . **NEW** famous ATLAS double-locking, lift-off fence . . . **NEW** dual V-belt drive . . . **NEW** grip-form miter gauge . . . **NEW** big, easy-to-read tilt gauge . . . **NEW** structural design mechanism . . . **NEW** clear-vision safety guard . . . **NEW** pyramid design stand. America's newest and finest circular saws sensationally priced . . . No. 3021 8" saw only \$87.50* less motor, guard, stand—No. 3061 10" saw only \$139.75* including guard.

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he's the man who knows power tools . . . let him help you get the most out of your home shop.

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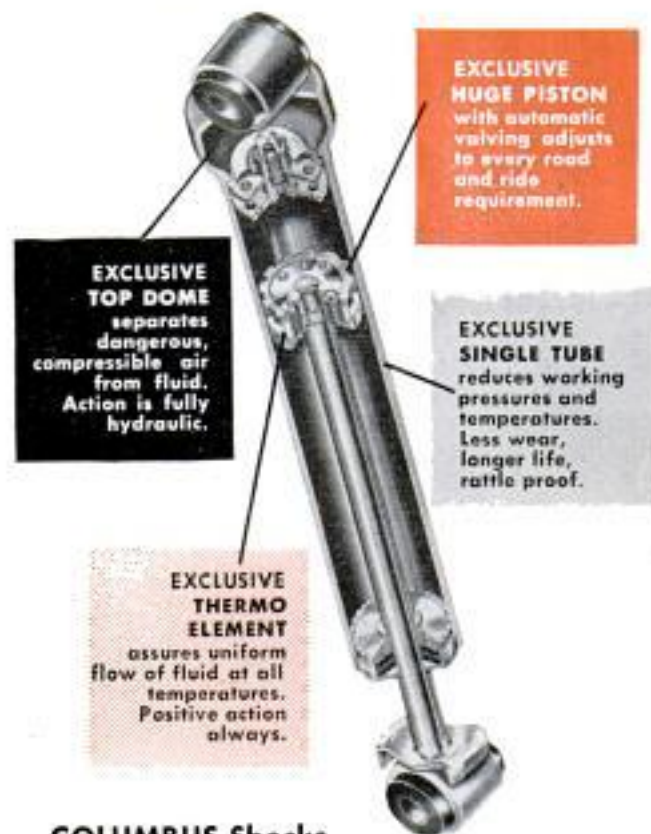
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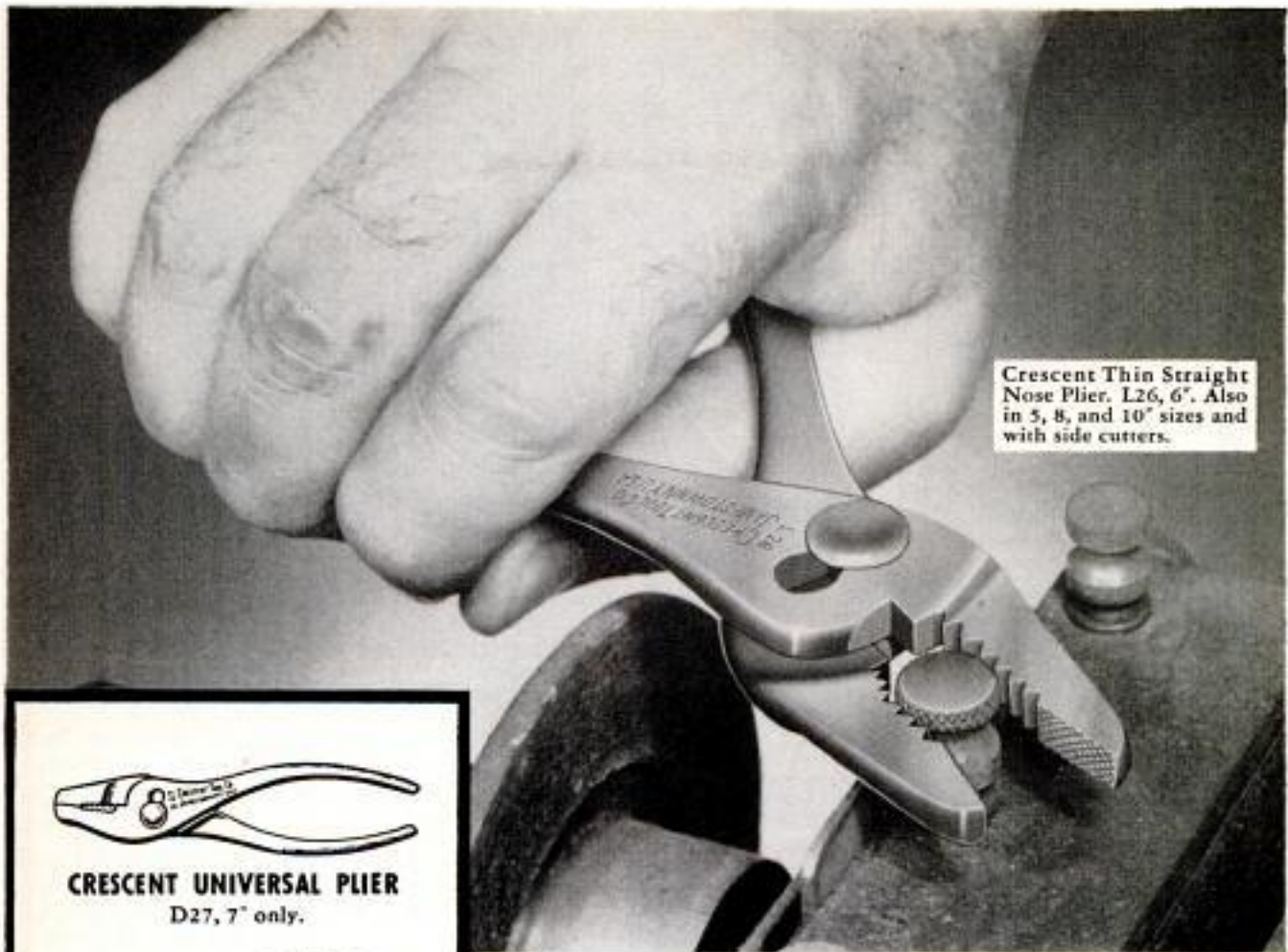
Absorbing interest in many diverse problems marked the careers of such men as Edison, Ford, Westinghouse, Steinmetz, Marconi, Morse, Watt, Newton, Galileo, Einstein, Faraday and Pasteur. It must not be forgotten that all these giants failed in many of their undertakings. Their numerous successes are partly due to the fact that they were eternally seeking, probing, puzzling—working on a wide variety of problems simultaneously.

Obviously you won't become an Edison or a Newton merely by employing the four principles discussed here. But on a scale in keeping with your native ability, training and environment, you can produce new ideas. To do so, cultivate passionate interest in problems. Approach them with an open mind, fed from several diverse fields of inquiry. Give the little-known mechanism of "inspiration" a chance by deliberate change of pace, working meanwhile on numerous and varied projects. ★ ★ ★

Plastic Window Frame Offers More Glass Area

Sturdy and durable is a new window frame made of plastic. Unlike other frames, it will not shrink, swell, rot or rust and never needs painting or refinishing. A glazing strip eliminates the need for putty. It costs no more than a wooden frame and offers 25 percent more glass area in a given opening. A package unit ready for installation includes a combination screen and storm sash. Rustproof metal fittings and aluminum or spring-bronze weather stripping complete the unit.





Crescent Thin Straight Nose Plier. L26, 6". Also in 5, 8, and 10" sizes and with side cutters.



CRESCENT UNIVERSAL PLIER
D27, 7" only.



MoToR KiT COMBINATION PLIER
G25, 5". Also in 6, 8, and 10" sizes.



CEETEECO COMBINATION PLIER
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CRESCENT THIN BENT NOSE PLIER
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Crescent offers a wide selection of styles and sizes in this widely used plier type. All are drop-forged from special analysis steel and finished in bright plate. They have sharply milled teeth, comfortable handles and smooth working joints. The joint bolt and nut are turned from solid bar steel and case hardened. Sold by Industrial Distributors and Hardware Dealers everywhere.

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SAVE OIL and ENGINE WEAR with this LONG QUART

This 100% Pennsylvania motor oil with THE *Tough-Film* stands up under intense heat, resists formation of oil-wasting engine deposits. Your engine stays clean, smooth-running, uses less oil. And because Pennzoil lasts so long, it guards against costly wear caused by acids and friction. Switch to Pennzoil now!

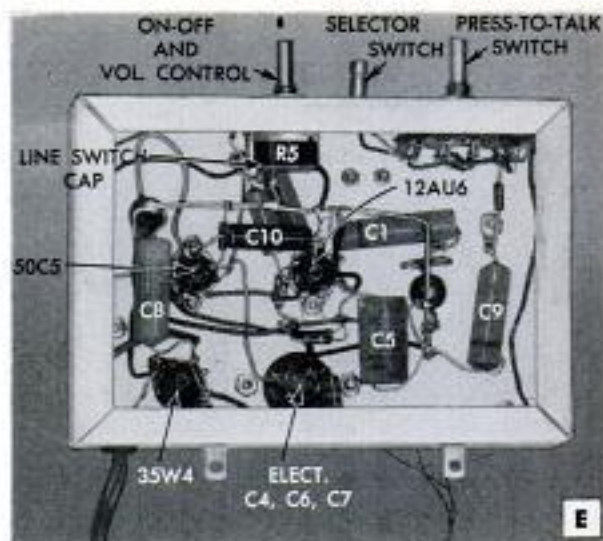
As big a difference as ever!

Most motor oils now contain detergents. A detergent's job is not to lubricate, but to improve conditions under which oil lubricates. Pennzoil, too, contains detergents, but its basic lubricating quality, resulting from superbly refined Pennsylvania crude, still provides an extra margin of safety.

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BETTER DEALERS IN EVERY STATE FEATURE PENNZOIL MOTOR OILS & LUBRICANTS



1954 "Little Giant" Low-Cost Multistation Intercom System

(Continued from page 159)

double-throw, spring-return switch which is normally in the position shown in the diagram. It connects the substation to the selector switch of the master station. When this switch is depressed, the substation is connected to terminal A1 which, in turn, goes through S1-C directly to the input transformer T1. It therefore bypasses the selector switch and permits any substation to call the master, regardless of the setting of the selector switch, so long as the press-to-talk switch of the master is in the "listen" position. The cable can be up to 1000 ft. long. The pilot light is No. 40. If noise is excessive, change value of C9 to .25 mfd.

No. 18 bare wire serves for B-negative bus (or common) floating ground side of the circuit. The only direct chassis-ground connections are made at points indicated by the chassis-ground symbol. The L bracket for the selector switch is 2 in. high and 1 1/8 in. wide. A standard sheet-metal chassis base 2 x 5 x 7 in. is used for the master station, see Fig. 1. The wood cabinet is a standard item, and it should completely house this a.c.-d.c. unit illustrated in photos A, B, D and E.

The small cabinets for the substations are a wall type covered with an attractive leatherette covering, see photo C for dimensions. Both these, and the master-station cabinet can be made with 1/4-in. plywood. When drilling the chassis base, the center of the hole for the press-to-talk switch is exactly 1 in. from the bottom of the chassis, as this switch is nearly 2 in. in diameter. Detailed student material list R-125 is available from Popular Mechanics Radio, TV and Electronics department upon receipt of letter postage. ★ ★ ★

Ford batteries are specially sealed in heavy, one-piece, impact-tested outer cases designed to give excellent protection against extreme temperatures. They are cycled from full charge to discharge hundreds of times to provide proper function and long life.



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**All Genuine Ford Parts—like the battery shown above—are made right...
to fit the specifications set by the men who originally built your Ford!**

Why wait for battery failure to stall your car when a simple dealer test can determine the condition of your present battery? If replacement is advisable, he can recommend the Ford battery with the *right* capacity for your car's electrical system. Remember, every Ford battery has a liberal warranty. Be sure—have your battery checked today and...



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ASK FOR THEM AT YOUR FAVORITE STORE
BURGESS BATTERY COMPANY • FREEDPORT, ILL. • NIAGARA FALLS, CANADA

A QUALITY DRY BATTERY FOR EVERY PURPOSE

Where to Find Fish in a Stream

(Continued from page 153)

shelter from the heat just as we do. Fish a bridge from the upstream side letting the lure ride the current into the deepest water under the bridge.

On most fast streams there are many bends where the water cuts under the banks. These spots are always deeper than surrounding water and may contain fish. If possible, fish them from the bank where they occur rather than from across stream. The lure is easier to control, you can stay concealed better and with a short line you are in better position to play the fish.

One of the most productive places is where a smaller stream empties into a larger one. Small streams carry a steady supply of food and there is usually an eddy formed at the junction. Cast the lure into the smaller stream, allowing it to float naturally into the larger one. You may see the swirl of a feeding fish almost as soon as the lure reaches the eddy.

Try the waterfalls in mountain country. Frequently they have pools or eddies behind them which are hard to reach but likely to contain fish. You may even have to poke the rod tip through the falls to get a lure into the water behind them but you don't have to worry about your approach. A fish lying in such water can see only a few inches because of air bubbles in the water.

In fishing a fast mountain stream your first consideration is to get the lure to float naturally into the most likely places. Usually you have trees, bushes or mountains behind you which prevent your figure from being silhouetted against the sky. Also fish cannot see too readily out of the fast moving water. This doesn't mean that you can go plunging carelessly along a mountain stream and hope to catch fish. Every advantage should be taken of the cover.

Fishing a meandering stream in open meadowland involves an entirely different technique. In general you should look for the same signs, except for waterfalls, but your whole approach becomes vastly more important.

There is seldom any cover back of you to hide your silhouette. The smooth surface allows the fish to see more clearly and, instinctively knowing that they in turn can be seen more clearly, they dart for cover at the slightest movement. Always approach a meadow stream cautiously from one side. Study the spot you want to fish from a distance to determine the flow, whether there are undercuts along the

(Continued to page 240)

Wider Speed Range Means Extra Tool Use

Now! Convert Your Band Saw
to a Metal Cutting Saw

CRAFTSMAN SLO-SPEED CONVERTER



Mount Slo-Speed Converter on motor shaft. Can be used with any 10-inch to 14-inch band saw with $\frac{1}{2}$ or $\frac{3}{8}$ -inch motor shaft.

CRAFTSMAN Slo-Speed Converter only
(Regular price \$25.00)

\$21⁹⁵ Cash
\$2.50 Down



Change Drill Press Speeds in
Seconds for Routing . . . Shaping!

CRAFTSMAN VARI-SLO SPEED CONTROL



Speed Control mounts right on drill press column. Variable speed pulleys mounted on four grease-sealed precision ball bearings.

CRAFTSMAN Vari-Slo Speed Control only
(Regularly \$22.95)

\$19⁹⁵ Cash
\$2.00 Down



Slows blade speed in seconds!

Price cut \$3.05. This amazing band saw attachment converts from hi-speed to slo-speed in just a few seconds . . . gives slower speeds necessary for cutting brass, aluminum, and other non-ferrous metals. Can be used with CRAFTSMAN 99-242B Band Saw, or ANY 10 to 14-inch band saw with 1750 R.P.M. $\frac{1}{2}$ or $\frac{1}{2}$ -H.P. motor and $\frac{1}{2}$ or $\frac{3}{8}$ -inch motor shaft. Gives 10 to 1 reduction ratio.

Converter mounts easily on motor shaft by locking one set screw and attaching two torque arms (furnished). Precision machined; has positive-drive cog belts. 6 self-lubricated ball bearings; one self-lubricated needle bearing. Built-in safety device helps prevent overloading of band saw blade and cog belts. Instructions included.

We recommend using CRAFTSMAN Band Saw Blades, 9-2625 for cutting steel (price \$1.98 each) and 9-2624 for cutting brass and non-ferrous metals (price 98c each). Blades are of finest quality saw steel. See the CRAFTSMAN Slo-Speed Converter at your Sears Retail Store TODAY.

Change speeds with tool running!

Price cut \$3.00. Saves drills! Saves time! For use with CRAFTSMAN Drill Presses 99-2314 and 99-2313 only. It's the ONLY drill press attachment we know of that gives a 12 to 1 ratio with just one hand lever, without changing belts! You can drill $\frac{1}{2}$ -inch holes in steel, and increase R.P.M. to routing and shaping speeds in seconds! Enables you to select any speed from 300 to 3750 R.P.M. without stopping spindle. Just slide hand lever and lock it at desired speed as shown on speed indicator. Hand lever and speed indicator are conveniently located in front, at top of drill press head.

Easily and quickly installed on drill press column. No holes to drill or tap! Made of tough aluminum alloy and cast Tenzaloy. Variable speed pulleys mounted on four grease-sealed ball bearings; lubricated for life. All steel parts are plated to resist rust. Complete with 3 CRAFTSMAN V-belts, set screw wrench, and instructions. See it at your nearest Sears Retail Store TODAY.

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TIPS for the HANDYMAN

ON USING L-O-F SUPER-FINE FIBER-GLASS

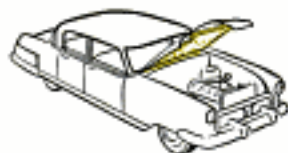
Here's a new insulating product of "1001 uses." Wonderfully easy to handle and apply. And so versatile, so effective, you'll find uses for it in a dozen places 'round the house.



Save fuel by wrapping fire-resistant Super-Fine around your heating ducts! Highly efficient heat insulation. Flexible, lightweight, easy to install.



Reduce dripping from cold water pipes. Reduce heat loss from hot water pipes. Spiral wrap them with Super-Fine. Will not mildew or rot.



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Get L-O-F Super-Fine at your favorite hardware dealer's, where this rack is on display. If your dealer doesn't have it, write Libbey-Owens-Ford, Fiber-Glass Division, 4834 Wayne Building, Toledo 3, Ohio.



FIBER-GLASS

banks and the point where you should make the cast. Now approach from one side, making sure your figure does not loom up suddenly. If necessary traverse the last few feet on your knees. If there are shrubs, weeds or high grass along the stream's edge, stay behind them and make a blind cast. Raise up just enough to enable you to watch through the leaves as your lure floats into the desired spot. If there is no strike lift the lure gently from the water for the next cast. Never jerk a lure from quiet waters.

Along these open streams look for deep pools and undercuts in grassy banks. Ride the lure into them without fuss from above. Work from one side, well back, never showing yourself at the stream's edge with clear sky behind you. It is usually best to approach the water with the sun at your back, providing your shadow does not fall directly upon the water. Fish, like people, have difficulty looking into the sun. For the same reason try to cast the lure to float on the sun side of where you believe the fish to be. They are more likely to mistake an artificial lure for the real thing and less likely to detect the leader when looking in the direction of the sun.

My favorite method of taking skittish trout from an open stream is to approach from concealment, drop a fly tied on a fairly short leader of five or six feet over the top of some brush or high grass and, keeping the rod tip high, let the current bounce the fly on and off the water. In this method the rod is held steady, no line or leader touches the water and the fly bounces up and down in one place. It is a strong-willed trout that can resist that action. I've taken fish with this dapping method when everything else has failed.

Along most streams worth fishing, you will find a well-defined path made by anglers going from pool to pool. You will notice that the path usually bypasses the shallows or riffles where anglers, in their rush to get to the next pool, have passed up some good fishing. Feeding fish often come up out of the deep water to feed in the riffles. A lure floating down the current in a natural manner may be taken by a whopper. In these spots I like to use a wet fly tied on the lightest possible leader, though early in the season a natural bait is better.

The streamside path also goes by those stretches where heavy growth makes it difficult to reach the water. The majority of fishermen don't care to struggle through brush to reach water that may not be worth fishing when they get there. For that very

(Continued to page 242)

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American Kitchen

Only \$9⁵⁹ a month... No money down!



Mrs. America of 1954 in "Mrs. America" house in Ellnor Village, Florida

... save even more ... install this 8-ft. kitchen yourself in a few hours!

This month only ... the complete "Mrs. America" kitchen is just \$299.95! Eight feet of American Kitchens' famous quality and work-saving, time-saving convenience ... 54" sink, two 21" base cabinets, two 21" wall cabinets, and two what-not shelves. Installation is so easy ... so fast! Instructions packed with cabinets. Quantities limited ... see your dealer today about this big bargain offer!

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AMERICAN KITCHENS DIVISION  CONNERSVILLE, IND.

Refinishing Furniture ?



Here's a kit-full of
**GOOD
SHORT-CUTS**
from "Handy" SANDY

Best news of the year for all you home-craftsmen is CARBORUNDUM's just-out "Furniture Refinishing Kit" — man, it's a dandy! A big 16-page instruction book takes you step by step . . . removing the old finish — staining, filling, sealing — sanding and rubbing final finish coats. There are 22 sheets of sandpaper, already cut to fit a sanding block — in 8 different grits and grades. Not just "sandpapers", but the top-quality papers the professionals use . . . garnet, silicon carbide waterproof, aluminum oxide moulding cloth.



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BIG-VALUE KIT AT
YOUR HARDWARE
STORE—OR DIRECT
FROM US, WITH
COUPON BELOW

It's worth over a dollar of anybody's money, but your hardware store or building material dealer sells it at about 90c. All stores **should** have it in stock, but of course there'll be some who won't. If your store is out, send me his name and address, and a dollar bill, and I'll send your Kit direct to you, postage paid. Use the handy coupon below — and please give me your dealer's name and address, so he'll have stock next time you go back. And you will go back, I'm sure — that's how good these sandpapers and easy instructions are!



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"Handy" SANDY
CARBORUNDUM®
Niagara Falls, New York

I usually buy my hardware and building materials at

Name of Store.....

Street..... City..... State.....

Enclosed is \$1.00. Send me your "Furniture Refinishing Kit"

My Name.....

Street & Number.....

City..... Zone..... State.....

90-227

reason, however, it may be the best spot on the river. In these protected stretches the fish will take lure properly offered. A short rod is easiest to handle here and a short leader is a must too, since there is seldom casting room. Usually you will have to poke the rod through the bushes and let the lure drop on the water, paying out line by hand as it moves with the current.

One of my favorite fishing spots is located less than 20 yards from a well-beaten path. The growth is so thick I have to crawl part of the way in, pushing my rod ahead of me. Each time I come out I first make sure no one is about, and I always conceal the spot. No one has yet intruded there and I feel sure I will have a "private" fishing hole as long as anglers follow the line of least resistance on that stream.

Some of our finest stream fishing is to be found in those streams so small they are passed up by anglers looking for bigger waters. Two of the best trout streams I have ever fished, one in Utah and one in New Mexico, are so narrow I can step across them at almost any point, yet I've taken limits on both streams in less than a half mile of fishing. You seldom take lunkers out of these little streams but they hold some mighty fine "eatin' size" trout.

Study the quieter patches of water to determine the kind of insect present near the surface, then select a fly that closely resembles the natural one. If possible use the real thing. In meadow streams, grasshoppers are good in late spring and summer. If you have any doubts about what the fish are taking, cut open the first one you catch and see what its stomach contains.

Whatever you use, if you study the water before you fish it, you will take home a heavier creel.

Next month: "Where to Find Fish in a Lake"

Aircraft Fuel-Weight Indicator

Weighing less than eight pounds, a new electronic instrument answers a pilot's problem by measuring airplane-fuel consumption in pounds instead of gallons. Jet engine fuels vary widely in density under different, fast-changing conditions and exact information on the weight of fuel entering engines has not been available to pilots or flight engineers. The Gavco Mass Flowmeter will extend the range of both jet and piston-engine aircraft by reducing the need for wide fuel margins for safety in flight planning. It fits into the fuel line and permits reading of the fuel-consumption rate in pounds-per-hour directly from an indicator, without the need for making additional calculations or corrections during a flight's progress.

Look what you can do with this New Black & Decker Saw!



\$64.50
B&D Utility 6"
Heavy-Duty Adjustable Saw
COMPLETE WITH BLADE

Try it yourself and get a chance to win \$1,000.00

Get a demonstration of this wonderful new saw at your Utility dealer. Then fill out a free entry blank, describing the features you like best—and you may win \$1000 in Black & Decker's big Saw Contest!



Bob Davis says:

Send 25c for my "Handy Tips" booklet, full of home repair ideas plus information on patterns for projects like sample below. * (No stamps, please).

*T. M. Rea, East-Std Pattern Company



For address of your nearest dealer see "TOOLS - ELECTRIC" in the Yellow Pages of your telephone book.

Need more living space? Do-it-yourself materials let you convert your attic or basement at far less cost than you ever dreamed! And the new Black & Decker Utility 6" Adjustable Saw takes the back-breaking work out of the job!

This new saw makes angle cuts, bevel cuts—every cut you need to add a beautiful room to your home, or make bookcases, cabinets, etc. You can get information on plans and patterns by mailing the coupon below, and your dealer will advise you on materials. When you visit him, ask to try the new Adjustable 6" Saw—as well as the larger 7-, 8- and 9-inch Heavy-Duty Utility Saws!



Fully adjustable for every depth and angle cut from 2" at 90° to 1 3/8" at 45°.



Powerful B&D-built motors take the tough spots without overheating or slowing.



New lever arm permits safe retraction of lower guard to make pocket cuts.



B&D saw-grip handle is always at natural sawing angle. Rugged, king-size shoe gives better balance.

Black & Decker

UTILITY [®] PORTABLE ELECTRIC TOOLS

Bob Davis, Home Service Dept. H3M, The Black & Decker Mfg. Co., Towson 4, Md.
Please send me "Handy Tips for Handy Men." I am enclosing 25c.

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Speedway teaches

BETTER SHOCKS

give smoother, safer ride!



BILL VUKOVICH, after winning the Indianapolis "500", said, "Again Monro-Matic Shocks (on my car) proved their ability to provide a safe, stable ride under the most adverse conditions." His opinion is supported by the astounding fact that in the 1953 Indianapolis "500," the four fastest cars were all Monro-Matic equipped.

SOFT, WHIPPY

SPRINGS of modern cars must be controlled by shock absorbers to prevent dangerous bouncing and to keep wheels on the road for best traction and safety. Worn shocks should be replaced promptly for greater safety and comfort.



IMPROVED TRACTION is obtained through the action of the new Monro-Matic Shock Absorbers, the only shock absorbers with automatic adjustment. Drivers report in qualifying tests at Indianapolis, "After installing Monro-Matic Shocks, increased miles per hour 10%."



SEND 10 CENTS for new Shock Absorber Manual. Tells the right shock for every car, gives instructions for removal and installation.

MONROE AUTO EQUIPMENT COMPANY
MONROE, MICHIGAN

Back-Loaded Cabinet for Super-Fidelity Home Phono

(Continued from page 160)

centered on the hand hole provided in item 7, the record shelf, Fig. 9. From the top, through the phono-motor floor, two more screws are inserted to hold the panel firmly. The dowel rod merely acts as a guide for centering the panel. Photo H shows rubber mounts for player.

The cabinet lid is fairly heavy, and you may wish to add a feature to make it easier to raise. This is a "light slam" device available from hardware stores, which includes two helical springs, two angle aluminum pieces and two short lengths of chain. It is easy to install and keeps the lid from going back too far. Note the cut-out in the rear of the record shelf Fig. 9, which is item 7. This does two things: it will support either 10 or 12-in. records, yet allows free passage of sound for the back-loading of the speaker (remove records). The hand hole cut in the front of the record shelf aids in removing records, and also permits easy access for screwdriver when inserting the panel holding screws in item 3, the speaker floor. Figs. 10 and 11 are speaker

(Continued to page 246)

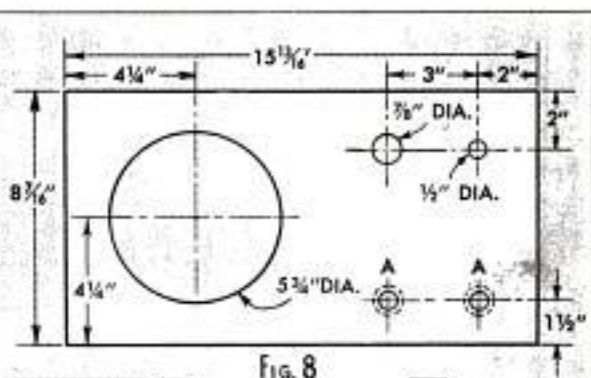


FIG. 8

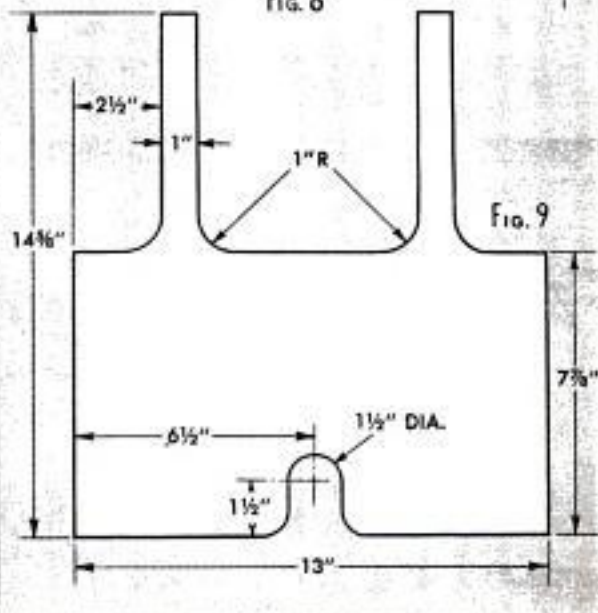


FIG. 9

"Your best buy in power saws is MAXAW 700 with magic•pivot"

says Paul Jones, President, Cummins-Chicago Corp.

The Cummins MAXAW 700 I'm using makes that all-important 45° cut in 2 x 4's—with blade to spare. It makes every cut for every house. In fact, on a dollar-for-dollar and pound-for-pound comparison, the MAXAW 700 outperforms every saw in the 7" field. Yet it's so perfectly engineered that it weighs only 10 pounds—much lighter than other saws in the 7" field.

There in a nutshell is the amazing story of MAXAW 700 with *magic•pivot*.

The man who brought about the engineering miracle of MAXAW with *magic•pivot* is Fred Wappat, often referred to as the "power saw Edison." Mr. Wappat pioneered the portable power saw and was responsible for many of its early developments, one of the most notable being the telescopic guard.

But his greatest achievement—and the greatest made by any one individual in the power saw field—is the *magic•pivot* in Cummins MAXAW. Now, here is precisely what *magic•pivot* does:

Blades last twice as long

magic•pivot gives the saw blade of your MAXAW greater cutting depth at 45°, you get blade to spare. MAXAW blades will take three to four more sharpenings than blades of similar diameter used on other industrial saws. This means *magic•pivot* lets you use blades twice as long.

"Stub-radius" blades reduce friction, shock
magic•pivot permits MAXAW to use "stub-radius" blades to do the same cutting jobs as heavier saws with larger blades. With "stub-radius" blades there is less leverage re-acting on the saw mandrel shaft. Therefore, there is less shock transmitted to the gears, ball bearings and armature of the saw.

Puts more power at cutting edge

Power always diminishes as it reaches out from the saw shaft to the blade cutting edge. With *magic•pivot* which enables you to use "stub-radius" blades, distance from the power shaft to the cutting edge is shorter than with larger blades. Result—you get more power where you need it—at the cutting edge.



Less bulk—less weight handicap for user

magic•pivot reduces the handicap you place on a man on the job. A 1200-lb. race horse is handicapped with an average of 1 to 10 lbs. of lead. He works only a few minutes in each race. A man weighs from 150 to 200 lbs. He climbs ladders, roofs . . . is on the move 8 hours a day. He's handicapped on the job with anything but the lightest weight saw—the MAXAW 700 weighing only 10 pounds.

Mister, if you want a power saw that saves you time, money and energy, you want the MAXAW 700 with *magic•pivot*. It's perfectly balanced to stay on the cutting line, guides itself without pulling or wavering. This is the portable saw priced for the home handyman as well as the professional user. Imagine being able to get all this performance in an all ball and roller bearing 10-pound power saw—for only \$69.50. That's right—only \$69.50 buys you the finest power saw in the 7" field—the MAXAW 700. Ask for Cummins MAXAW 700 at your hardware or lumber dealer's. Don't settle for anything less. I'll be glad to send you our fully documented folder: "What *magic•pivot* Means To You." Every man who is interested in portable electric saws should read it. Please write me today.

Sincerely, *Paul Jones*
PRESIDENT

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CUMMINS-CHICAGO CORP., 4740 N. Ravenswood Ave., Chicago 40, Ill. In Canada: 334 Lauder Ave., Toronto 10
Makers of MAXAWS, MAXDRILS, BALL•RITE and PERM-ALIGN DRILLS, FIXMASTER KITS, do-it SHOP

Save money DO IT YOURSELF with SPEEDY RIVETS



BIND REPORTS



REPAIR LUGGAGE



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MEND CLOTHES

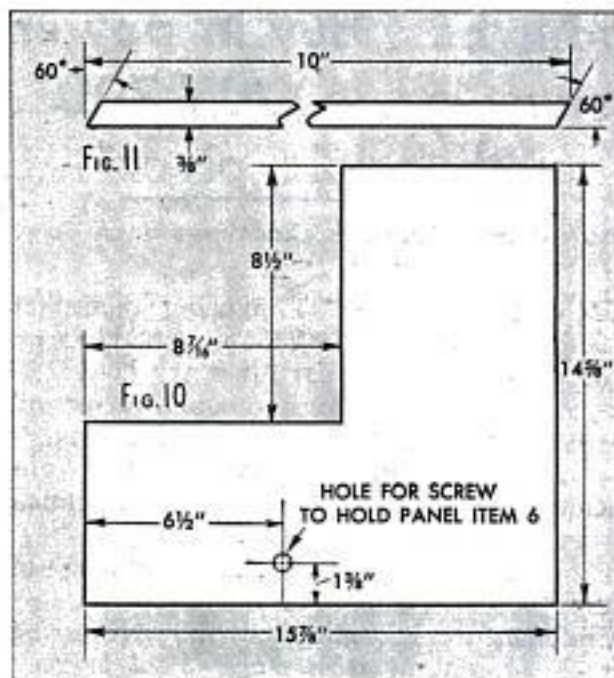
Do jobs you never thought you could do yourself . . . fasten cloth, paper, plastic sheeting . . . ideal for craftwork, too . . . quick, secure, permanent. Simply punch a hole in each part to be fastened, push rivet together through holes, place on firm surface and swat with a hammer. Gilt, nickel, black, brown finishes: Large (6 to a card) or small (10 to a card) sizes.



AT HARDWARE COUNTERS
EVERYWHERE 15¢ per card

THE **DOT** LINE

CHICAGO 8, ILLINOIS



floor and baffle details, items 3 and 10.

When finishing the cabinet, use No. 00 sandpaper in the direction of the grain. Follow this with an oil stain. This dries in a few minutes, but should be left overnight to set. Finish with a clear varnish.

A few final tips on the operation of the amplifier may be useful. If it should "putt putt" (motorboat), the 15,000-ohm feedback resistor value is too low and should be replaced with a higher value, such as 20,000 or 25,000 ohms. Match resistors R19 and R20 should be alike for balanced operation. Detailed student material list R-424 covering the complete amplifier and cabinet construction article is available from Popular Mechanics Radio-TV and Electronics department upon receipt of ordinary letter postage. ★ ★ ★



POPULAR MECHANICS

Truck Limpy?



Payload Skimpy?



Cab Crimpy?



Solve it Simply?

See the '54 **REO Today!**

Reo's *Gold Comet* power whisks Reos over hills up to 15% faster than similar trucks carrying the same payload. Speaking of payload . . . Reo's exclusive more-payload design permits heavier loads and bigger ton-mile earnings. The new luxurious cab provides every convenience . . . increased head and leg room . . . full 30" door opening . . . new steering wheel angle gives unobstructed driver vision . . . electric windshield wipers . . . foam rubber seat available on all models. This is only a part of the story, get the proof yourself . . . test drive a REO and learn to relax!



REO MOTORS, INC.

LANSING 20, MICHIGAN

Manufacturer of Commercial & Military Trucks • Buses • Power Lawn Mowers • Children's Wheel Goods & Playground Equipment • Inboard Engine Kits for Small Boats • Replacement Engines for Trucks • Industrial Engines

MARCH 1954

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So easy to have the windows you want with the **NEW CURTIS** **CONVERTIBLE**

Here's the most amazing window you've ever seen! The new Curtis Convertible wood window can be used as an awning—casement—hopper-type sash—in more than a thousand different combinations! And the Curtis Convertible is so easy to install! It's completely factory assembled with basic frame, operating hardware, sash, screen and insulating light. Low in cost, the Curtis Convertible is fully guaranteed as to materials and workmanship.



Here the Curtis Convertible is used as a casement.

Ideal for use as awning style window.

Ventilation at floor level with hopper-type window.

Sold through retail lumber dealers everywhere.



Curtis Companies Service Bureau
200 Curtis Building
Clinton, Iowa

Please send literature on Curtis Convertible windows and other Silentite window styles.

Name.....

Address.....

City.....Zone.....State.....

The Shape of Tomorrow's Planes

(Continued from page 138)

are three problems that have to be studied together.

The most practical engine for high speed at present seems to be a jet engine equipped with afterburner. This combination makes best use of the jet at low speeds and takes advantage of the afterburner at high speeds. The combination is lighter and has less frontal area than a jet engine designed to produce the same amount of power. The ramjet, excellent at supersonic speeds inside the atmosphere, is inefficient at subsonic speeds. Rocket engines are best of all in theory but they are ruled out except for short bursts of speed because they consume from six to eight times as much fuel as does an afterburning jet.

One problem that is occurring already is the aerodynamic heating of the engine intake air at high speeds. At 750 miles per hour at low altitude this can amount to 100 degrees. When added to the heat of combustion, the temperature inside the engine may approach the thermal limit at which the engine is designed to operate. Turbine blades may melt or fly apart. Blades that are made of special high-temperature metals or of ceramic materials may be a solution, if such blades can be built.

The vulnerability of engines, electrical systems and the pilot to heat suggests that our present airplanes couldn't travel faster than 700 miles per hour at sea level or 1200 miles per hour at 35,000 feet even if they had the power to do so. The 700-miles-per-hour aircraft would be subjected to a temperature rise of 100 degrees, while the plane traveling at 1200 miles per hour would have a heat rise of 275 degrees.

It's true that several planes have gone faster than these speed limits but only for a relatively few seconds at a time. The Skyrocket, for instance, didn't travel at 1327 miles per hour long enough to overheat. If it had continued to cruise at that speed the whole plane would have attained the temperature of boiling water. The X2 research plane, successor to the 1600-miles-per-hour X1A, has a skin of stainless steel to resist the softening effect of heat.

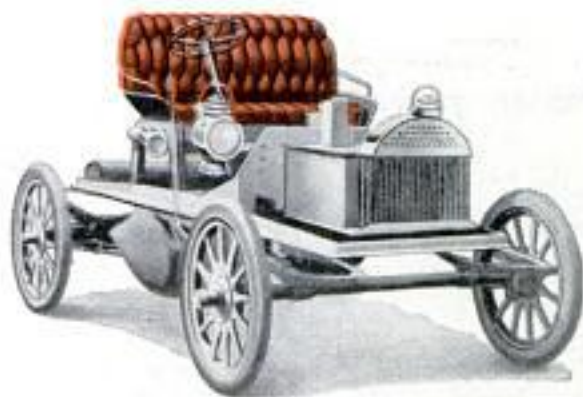
Aerodynamic heating from friction with the air is a problem at today's fast cruising speeds. Complex and relatively heavy refrigeration equipment has to be installed in fighter aircraft to keep the electronic systems and the human pilot at safe operating temperatures. In addition to the aerodynamic heat there is the heat from the electronic systems that must be dissipated. Already the problem is approaching the

(Continued to page 250)

What a Difference

Between the Oldest and the Newest

BUICK



This 1903 "buckboard" model was the earliest of all Buicks. It had a two-speed transmission and a dependable two-cylinder engine which developed 21 horsepower.



The spectacular "Skylark" has a 200-horsepower engine. On a chassis with 122-inch wheelbase, the car is less than five feet high, even when the top is up.

And What a Difference in Plug Performance Since AC Developed the Patented CORALOX Insulator



Original Equipment
on Nearly as Many New Cars
as All Other Makes Combined

The 1903 Buick was as much a sensation in its day as the sleek new "Skylark" is today. But what a difference that half century has made in Buick appearance and performance! AC Spark Plugs have a similarly brilliant record of improvements down through the years—the latest and greatest of which is the patented CORALOX Insulator.

CORALOX has no chemical attraction for the oxide coatings resulting from the burning of leaded fuels. What's more—CORALOX is so amazingly strong that AC can use longer, thinner insulator tips which heat up faster to burn away oil and wet carbon deposits. As a result many motorists—

- GET UP TO 10% MORE POWER
- SAVE UP TO ONE GALLON OF GASOLINE IN TEN

AC SPARK PLUG DIVISION



GENERAL MOTORS CORPORATION

Gardeners you know:



Clara Froo-Froo

Miss Froo-Froo turns up her nose at all but the most costly specimens of flora. Pays up to \$75 for a single bulb. Has custom-made plant food flown in from Venezuela every week. Looks down her lorgnette at Vigoro* because she can't believe it could possibly be specialized enough for her posies and lawns.

Miss Froo-Froo is not as unusual a gardener as you might think. Many people believe that a plant food must carry a big price tag and a fancy label to be effective.

They fail to realize, as you might, that Vigoro is not only complete, but scientifically balanced to give amateur and expert alike the best results. Proof of this is the fact that gorgeous flowers have been grown in sterile sand with no other nourishment but Vigoro.

The truth is, you might pay more for some plant foods or use less of others, but you actually can't feed better than Vigoro, the most widely used plant food in the world.

Use regular Vigoro or the new Instant Vigoro that's soluble in water.

*Vigoro is the trade-mark for Swift & Company's complete, balanced plant food.



point where it may be necessary to insulate the pilot from the cockpit by designing a ventilated flying suit through which a stream of cool air is pumped. In making their runs for the world record last fall the British played extra safe and placed slabs of Dry Ice in the cockpits to help keep their pilots cool.

The nose and adjacent windshield area of a plane heat up first and attain the highest temperatures. This is especially unfortunate because plastic windshield materials are among the first substances that fail when the heat goes up. Double-walled windshields with cool air circulating between the walls may have to be adopted soon.

No real cure for aerodynamic heating is in sight, and the problem is being attacked in two ways. One is to build fast aircraft of materials that won't be affected by heat to the point of failure, the other concerns the possibility of preventing the aircraft from heating up even though it does fly fast.

It would be nice to put insulation on the outside of a plane, or to envelop the plane in a film of cold air, if either was possible. Reducing the friction that causes heat seems more practical and, working toward that idea, the NACA is investigating what is called laminar flow. It's the air of the boundary layer clinging to a plane's surfaces that heats up first, the theory goes, and this air in turn transmits heat to the structure. If the surfaces of the plane can be made as smooth as glass and if the entire aircraft is aerodynamically smooth, there will be less friction and the boundary layer won't heat up as much. That's the idea, though manufacturers groan when they consider the problems of building a really slick aircraft.

One thing the engineers are confident about: In the long run the thermal barrier will be overcome just as a solution was found to the sonic barrier that only a few years ago was thought to be a final speed for inhabited aircraft. The sonic hurdle became nonexistent when new planes, airfoils and engines were developed to overcome it. Similar research aimed at overcoming the thermal barrier will achieve similar results. ★ ★ ★

Ideas Popping Up at Faster Rate

Inventors in this country are developing new ideas at an increased rate. At the beginning of 1954 there were a total of 105,303 patent applications on file at the Patent Office. This compares with 97,747 at the start of 1953. The Patent Office, since it issued its first patent in 1790, has granted more than 2,665,000 patents.

Ask your hands to tell you

You don't have to be a carpenter to want, yes, even to need — fine tools. Put a Stanley tool in your hands. Use it. You'll feel the difference. For everyone from schoolboy to professional

Stanley is the toolbox of the world.

Tool UP With Stanley Take this "100 PLUS", for example. Sure, you can drive a nail with almost any hammer — one way or another. But your hands will tell you *this* one. It hits the nail hard, and drives it straight and deep. You'll get a smacking sense of satisfaction every time you use it.

*Western prices slightly higher.

"100 PLUS"
No. 111½ — \$3.50*

Measure UP With Stanley



No. X226 —
6 ft. — \$2.75

A good rule is a must, and a new favorite is this Stanley '100 PLUS'. It's a good friend, many times tested and all ways true. The joints lock firmly, the square ends stay square, the handy 8-inch brass slide slides but never slips, the easy-to-read numbers are always easy to read. For *more* than a measure of satisfaction, say Stanley the next time you buy a rule.

Tool UP With "YANKEE"



No. 41 — \$5.65

The "Yankee" push drill is a quick, one-hand worker . . . the ideal tool for boring screw holes. The drill point spirals in easily and the built-in spring returns the handle for the next stroke. You're through in no time. What's more, the magazine handle holds 8 drill points from 1/16 to 13/64 inch — the size is always right.



THE TOOL BOX OF THE WORLD

STANLEY Tools

How Long Is Your Square Tongue?

Sure that's a silly question. But if you haven't a steel square you'll never know.* On the other hand, with one of these Stanley rafter squares you can really get on top of things — build a roof, for instance, on your new porch or garage. Send for your free copy of "Rafter and Framing Squares". You'll learn all about roof framing, common rafters, hip and valley-rafters, brace measures, etc. Use the coupon.

*The Stanley rafter square tongue is 16" long.

ELECTRIC TOOLS • HARDWARE • STEEL STRAPPING • STEEL

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- Please send me STANLEY TOOL GUIDE for which I enclose 25¢.
 Please send me FREE "Rafter and Framing Squares" — \$51.
 Please send me FREE "YANKEE" Tool Book Y41.

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HOW TO FINISH OFF YOUR ATTIC



This free book makes it easy...

You can turn wasted attic space into extra rooms in a jiffy! These 8 pages of step-by-step, easy-to-follow instructions tell you how to floor, frame, trim and paint. And how to insure comfort with efficient, fire-safe, sanitary Fiberglas* Insulation! Write for your copy and get started—now!



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FIBERGLAS

Owens-Corning Fiberglas Corporation
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Please rush a copy of the "How to finish off your attic" book to:

NAME _____

ST. ADDRESS _____

CITY _____ ZONE _____ STATE _____

ST. M. Reg. U.S. Pat. Off.

Here's the Long-Life Battery

(Continued from page 99)

A plate measuring about $2\frac{3}{4}$ by $2\frac{1}{2}$ inches contains not less than 125 square feet of chargeable surface area. The result is a lot of power from a little package. And it will deliver that power at a steady level if you pull at it fast or slowly.

A tiny transparent plastic cell the size of a cigarette lighter puts out enough juice to light up 100 flashlight bulbs at once. A five-celled unit, measuring about 4 by 6 by 2 inches, packs about 300 amperes, enough to start a car engine. Of course there wouldn't be much left for lights, wipers or radio after the start.

Engineers at Sonotone are still testing their battery under every conceivable condition. One unit has been drained and recharged 3000 times under varying temperatures and conditions. Stored away, fully discharged for several years, they zoom right back up on recharging, good as new. They have been left standing for days in weather down to minus 40 degrees, and they started the car engines at the touch of the starter button. There's a big battery in Canada now for tests down to minus 65 degrees. The freezing point of the potassium-hydroxide electrolyte is minus 75 degrees.

Sonotone's battery had its beginning after World War II, when Hector was tossed the job of developing a rechargeable battery for hearing aids. It wasn't until 1948 after an intensive hunt that his research team came on the work the Germans had done and decided to iron out production bugs the Nazis never solved. By the time they had the thing licked, hearing-aid dry cells were down to lipstick size; transistors promised to reduce them to the size of aspirin tablets and give them great additional life. Nobody needed a hearing-aid battery that could be recharged.

But the battery had other uses. The Signal Corps looked and suddenly decided it needed some larger ones. In the past four years Sonotone made 600,000 of them for military equipment. In 1953, Navy contracts totaling \$1,000,000 went to the SAFT company in France for similar sintered-plate nickel-cadmium batteries. This year, with removal of controls on precious nickel, both companies plan to storm civilian markets. The American Bosh Company of Springfield, Mass., and Canadian Aviation Electronics in Montreal, also will produce them under license from Sonotone.

"We hope to have ours for sale in places like accessory shops and some service stations in 1954," says Dr. Hector. "They

(Continued to page 254)



Clean, easy-to-apply PENTA adds years of useful life to the things you build with wood

THE DOW CHEMICAL COMPANY
Dept. PE-765N
Midland, Michigan



- Please send FREE BOOKLET—"Handyman's Guide to Home Wood Preservation."
 Send the name of my nearest PENTA dealer.

Name _____

Address _____

City _____ Zone _____ State _____

Building your own lawn furniture saves money and it's fun, and you add to the profit *if* you protect the wood against termites and decay with PENTA*. PENTA is easy to apply—simply flood it on with a broad brush or dip each piece before assembling. This leaves the wood clean, pleasant to handle.

Water-repellent solutions containing PENTA also improve dimensional stability and reduce checking caused by moisture and hot sun. Wood treated with these solutions is paintable. "Handyman's Guide to Home Wood Preservation", a booklet by Dow, tells you how to use PENTA solutions on all the projects you plan for house and garden. *Send for your free copy.* Your local lumber dealer or hardware store has name-brand wood preservatives containing *PENTACHLOROPHENOL in regular and water-repellent types. Look for the name PENTA on the can. THE DOW CHEMICAL COMPANY, Midland, Michigan.

you can depend on DOW CHEMICALS

DOW

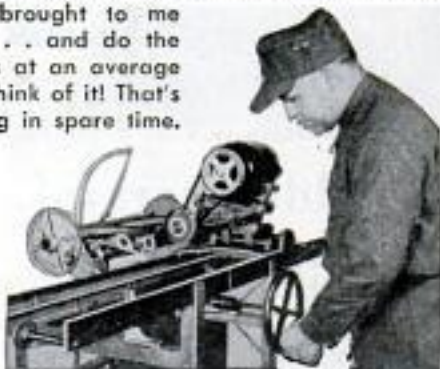
**WHAT
DO YOU WANT?**

**A GOOD BUSINESS
OF YOUR OWN?**

**A HIGH PAY
SPARE-TIME
JOB?**

Then **FOLLOW THIS
PROVED SUCCESS PLAN!**

Here is your chance to be your own boss, secure financial independence, build a future for yourself and your family in a profitable business in your own garage or basement. J. S. of Michigan writes, "I figure my profits (last season) at over \$1,000.00." Mr. C. H. R. of Ohio says, "This season I have taken in \$3,688.20." J. P. of Pennsylvania writes "I spent only 40c for a newspaper ad and have done nearly \$500.00 worth of business." Another owner writes, "I have had 4 mowers a day brought to me since last May . . . and do the grinding evenings at an average of \$2.50 each." Think of it! That's \$10.00 an evening in spare time. If you want to get ahead, make big money, be your own boss. Act Now. Write today for full details of our proved success plan.



ONLY ON THE UNIVERSAL LAWN MOWER GRINDER

can the inside face and edge of the stationary blade, and all reel blades, be ground to proper clearance

ALL IN ONE SET-UP

WITHOUT REMOVING ANY BLADE FROM THE MOWER

. . . that's why this business is simple, easy, and interesting. No experience or long hours of study are necessary. A leading National Magazine says, even an inexperienced worker can do a good job. We furnish complete instructions, everything you need to get started . . . But you must take the first step. Just fill in and mail the coupon below. Do it right now.

ROGERS MFG. CO., DEPT. M-34, LINDSEY, OHIO

SEND THIS COUPON NOW

ROGERS MFG. CO., Dept. M-34, Lindsey, Ohio

Please send me full details about the profit possibilities of Lawn Mower Sharpening.

NAME _____

ADDRESS _____

CITY _____ STATE _____

should be supplied as original or optional equipment in some cars during the second quarter of this year."

"Percentage-wise," says Dr. Hector, "our biggest market won't be automobiles, though we expect to sell a lot of them in the cold parts of the country where car-starting is tough in winter. Taxicabs, whose engines seldom stop, wear out heavy-duty batteries at the rate of one every four to six months, but they'll have a tough time beating up one of these inside 10 or 20 years. We think they're naturals for trucks, buses and other hard users."

Most of them, however, Sonotone expects will go to industry—in ships, boats, planes, diesel engines, miner's lamps, power stations, isolated unmanned relay stations for radar or TV and standby equipment like emergency telephone generators—where the batteries would kick over after years of standing idle and being virtually ignored. Railroad block signals may see them as a power source. ★ ★ ★

Radar Spots Cancer

With a new radar tool, doctors may soon bring about early detection of interior cancer. The device emits radar beams as it is used to scan the patient. A near-by screen registers impulses rebounding from tissue, with cancerous tissue producing a denser impulse. Dr. John Wild demonstrated the device at a Minnesota Medical Association Convention.



BRAND NEW!
RUGGED!! MASSIVE!!

*** 25 TON CAPACITY HYDRAULIC CYLINDER**

- ALL STEEL CONSTRUCTION
- 8" BORE—15" STROKE
- DOUBLE ACTION



ITEM #1815
• 50,000 LBS. PRESSURE WITH 1000 P.S.I. PUMP OUTPUT.

- UP TO 70,000 LBS.—CAPACITY ON INTERMITTENT SERVICE.
- SOLID STEEL 2 1/2" PISTON ROD
- 1" PORTS
- OVERALL DIAMETER—10 1/2"
- DISTANCE BETWEEN CENTERS—28 1/4" CLOSED—43 1/4" OPEN.

IDEAL FOR:

- HYDRAULIC PRESSES • DUMP TRUCK HOISTS • TD-18, TD-24 INTERNATIONAL HARVESTER DOZERS AND GRADERS • LEVELING RAMPS • INDUSTRIAL MACHINERY • ROAD MACHINERY • FARM MACHINERY • HYDRAULIC TAIL GATES
- Replacement cost—\$100.00.
Shipping Wt.—185 lbs.
SPECIAL PRICE 95.00
F.O.B. Chicago.....

ITEM #1715

- 7 1/4" BORE—15 1/2" STROKE
 - 41,300 LBS. PRESSURE WITH 1000 P.S.I. PUMP OUTPUT.
- OTHER FEATURES SAME AS ABOVE
Replacement cost \$260.00.
Shipping Wt.—153 lbs.
SPECIAL PRICE 80.00
F.O.B. Chicago.....

BRAND NEW DOUBLE ACTION HYDRAULIC CYLINDERS



NEW MANUFACTURE

- ITEM #224—3 1/2" bore, 24" stroke, will lift 8250 lbs. with 1000 P.S.I. line pressure. 1 1/2" pipe thread ports—1 3/4" stress-proof ground, polished & plated solid steel shaft. Overall length closed 30".
Ship. Wt. 90 lbs. **39.60**
F.O.B. Chicago.....

- ITEM #16-C—1 1/2" bore, 26" stroke. Will lift 1760 lbs. with 1000 lbs. pump pressure. Great for hay loaders, etc.
1" stainless steel piston rod. Postpaid... **16.95**



- ITEM #355—2 1/2" bore — 7 1/2" stroke. Mfgd. by Delco-Remy. Clevis mounting.
3/4" pipe thread ports. **16.00**
F.O.B. Chicago.....

BRAND NEW! JUST RELEASED! BLACKHAWK HAND-HYDRAULIC PUMP

- ITEM #82. Perfect for Hydraulic Presses, Snow Plows, Farm Wrenches, Jacks, and Farm Plows. A few easy strokes of the 20" handle and you can lift 5000 lbs., using Item 355—Hydraulic Cylinder.
Blackhawk Model P-151—complete with built-in oil tank and release valve.

- Rated 1200-8400 lbs. per square inch. Dim. 9"x7"x6". Ship. wt. 35 lbs. Worth much more. F.O.B. **22.50**
Chicago.....

FREE SPRING — EDITION

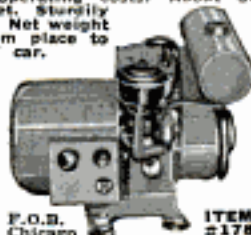
1954 CATALOG, 52 PAGES, chock-full of unsurpassed War Surplus Equipment Bargains for farm, home, factory and workshop. Write today. Most advertised items just released, not yet in catalog.

BRAND NEW WAR SURPLUS. * RELEASED SINCE KOREAN TRUCE

NOW . . . SAVE \$161.00 on this \$250.00 VALUE
350 WATT A. C. PORTABLE ELECTRIC LIGHT PLANT

- Compact Electric Plant suited for small homes, cabins, campers, hunting and fishing camps, trailers and small electrical home appliances. Operating costs: About 5c per hour. Runs exceedingly quiet. Sturdily constructed for dependable service. Net weight only 88 lbs. Can be carried from place to place, or transported in trunk of car.

350 Watts—110 Volt—60 Cycle—A.C. Model—34-S, 35-3, made by Midea Mfg. Co. 1 Cylinder, 4 Cycle Engine complete with muffler, starting rope and oil bath air cleaner, direct coupled to a 350 Watt Generator with voltage control rheostat and twin outlets. Engine speed 1800 R.P.M. Shipping Wt. 116 lbs.
Commercial List Price \$250.00
NOW ONLY **89.00**



F.O.B. Chicago ITEM #178

FOUR-WAY, OPEN CENTER CONTROL VALVE

- ITEM #126 with built-in adjustable relief valve. Factory set at 1000 P.S.I., spring loaded neutral position, for use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Fully balanced plunger type, smooth, positive, easy operation. Can be used as single unit or mounted in series of any combinations desired. Has 3/4" pipe thread inlet and outlet, 1/2" pipe thread cylinder ports. Newly manufactured to our specifications.

Shipping weight 8 1/2 lbs.
An outstanding buy! . . . F.O.B. Chicago. . . **21.50**

GOV'T. SURPLUS! JUST RELEASED!

*** 2-TON, 6-WHEEL HYDRAULIC LIFT TRAILERS**

- USE FOR: Conveyor ramp • Boat trailer • Lumber • Pipe • Pole trailer • Machinery trailer • Hydraulic dump for grain wagon • Coal truck • Lift truck • Variable height hydraulic work table • Removable rack permits use of hydraulic lift for other installations. Outstanding features of these trailers are—4000 lbs. payload, 2 individual hydraulic lifts complete with hand pumps and valves, 4 18"x5.5 pneumatic tires included. Manual screw-down brakes. Ball-bearing axles. V-shape load rack—8' long. Towing tongue, 54" lift. Wheelbase 98". Ground clearance 4 1/2". Tread width 52". Overall width—58". Overall length including drawbar—167". Gov't. cost \$685.00. Ship. wt. 1400 lbs. F.O.B. Chicago. **169.50**

HYDRAULIC SPEED REDUCER with FINGERTIP CONTROL

- USE FOR: Reamer Drives • Midget Cars • Feed Mills • Canning Machines • Conveyors • Lathes • Milling Machines • Motor Boats • Cream Separators • Garden Tractors • Pumps

- Variable output speeds from 0 to input speed available by moving control handle. Locking handle maintains setting. Use input power of 1/2 to 1 1/2 H.P. This Westinghouse-Oil Gear Unit consists of a variable displacement hydraulic pump feeding a fixed displacement hydraulic motor. Adjustable relief valves set at factory for 100 inch pounds of torque may be reset up to 180 inch pounds. Independent reverse control allows full output power and speed selection in either direction of rotation. Shafts measure 3/8" diam., include keyway. Input rotation is counter-clockwise facing shaft. Recommended input speed not to exceed 750 R.P.M. Overall dimensions, 7 1/2"x7 1/2"x11 1/2". Gov't. acquisition cost \$428.00. Ship. wt. 31 lbs. Complete with 2 qts. of oil **54.50** and full instructions. F.O.B. Chicago.

BRAND NEW — BERRY — HEAVY DUTY HYDRAULIC PUMP OR MOTOR

- NEW MANUFACTURE
ITEM #166—use on farm equipment, road machinery, vibrators, paper mills, wire reels, hydraulic brakes. Ball bearing construction, balanced cam design assures high efficiency performance. When used as a pump: delivers 11 G.P.M., 1000 P.S.I., 8 H.P. at 1800 R.P.M. as a HYDRAULIC MOTOR: Rated up to 12 H.P., up to 2400 R.P.M. Standard 3/4" pipe thread ports, 3/8" shaft with keyway. Dimensions 14 1/2"x8"x7". Weight 63 lbs. Regular price today \$912.00. Our money saving price **59.50**
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F.O.B. Chicago



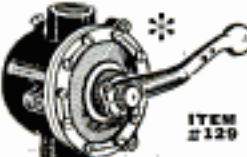
PUROLATOR OIL FILTER

- ITEM #70—A perfect permanent element oil filter to keep your motor oil or hydraulic fluid clean at all times. Protect your pump or engine with this unit. Just turn the handle and the element is clean. Standard 3/8" inlet and outlet ports accommodate 16 gallons per minute. Shipping weight 4 lbs. \$1.90 value. **5.95**
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SELF-PRIMING HAND FLUID PUMP WITH STRAINER

- TYPE B-2 — Bronze 2 1/2" diameter construction. 1/2 in. pipe thread ports. Fine general utility hand pump. May be used as a sump pump, barrel pump, fuel transfer pump, for water, oil, gasoline, insecticides, etc. Capacity—200 Gal. per hour. **11.95**
Ship. wt. 6 lbs. F.O.B. Chicago



ROSS 4-WAY FOOT OPERATED AIR VALVE

- BRAND NEW — For double acting pneumatic devices. Fine for operating presses, air vises, and machinery of many types. Heavy duty cast construction. No neutral position. Maintains pressure against the piston when the foot control is in the "Up" position. Threaded for 1/2" pipe. Dimensions of valve body: 7 1/2" long x 4 1/2" width x 7 1/2" high. Net weight 28 lbs. A \$64.00 value for only. . . . **19.50** F.O.B. CHICAGO



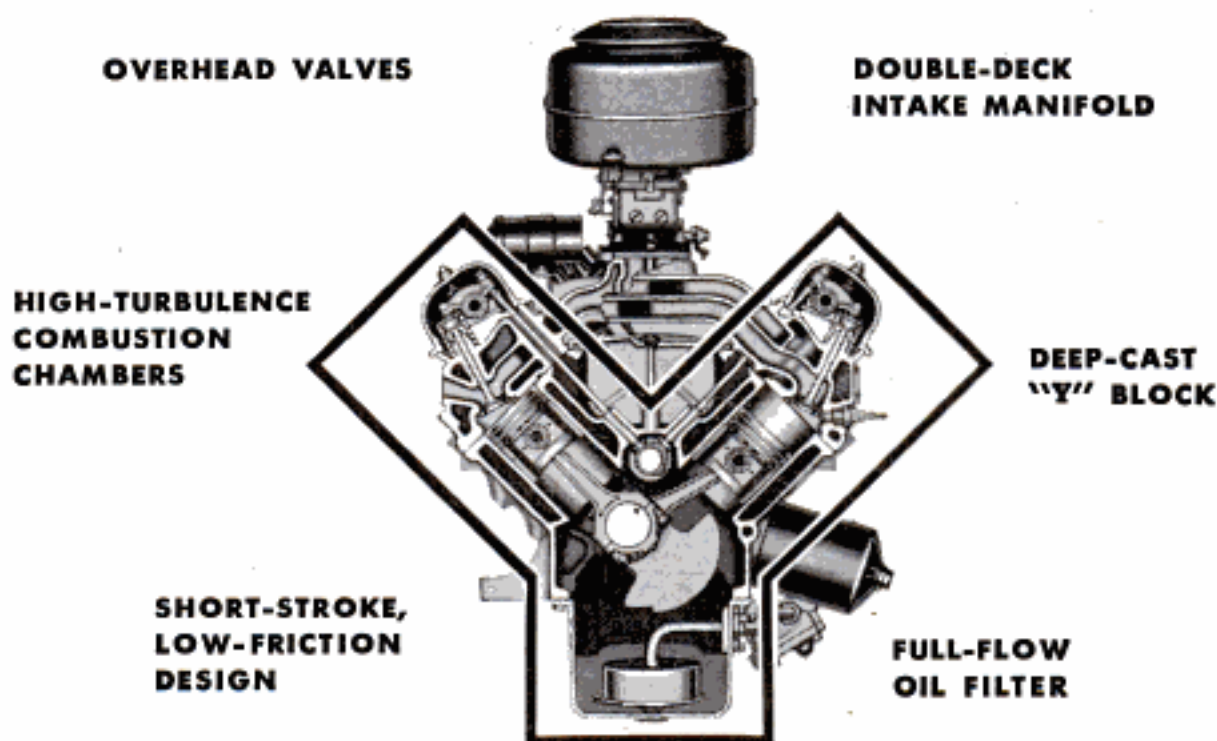
D. C. GENERATORS

- TYPE ITEM #91
Rated 300 Amps.—110 Volts. Mfd. by Jack & Heintz. Gov't. Acq. Cost \$380.00. Ship. wt. 55 lbs. Dimensions 16" x 10" x 7". **35.00**
F.O.B. Chicago
ITEM #90 — Type P-1, rated 200 Amps.—28 Volts, 2500 RPM. Mfd. by General Electric, Ford, Delco-Remy and Westinghouse. Gov't. Acq. Cost \$300.00. Ship. wt. 55 lbs. Dimensions 15"x9"x6". **22.50**
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TO PLACE PHONE ORDERS CALL Webster 9-3793



THE NEW 130-h.p. Y-block V-8

The story behind Ford's "Y" and "I" . . .

the two most modern engines in the industry

Twenty-two years ago Ford introduced the first V-8 in the low-price field. The basic design innovation then was the one-piece cylinder block . . . a design characteristic that has since been adopted by all other builders of V-8 engines. And now, with 22 years' experience building V-8's, it is only logical that Ford is first in its field to introduce a brand new type of V-8 . . . the Y-block V-8—along with the industry's most modern Six . . . the I-block Six.

Deep-block construction

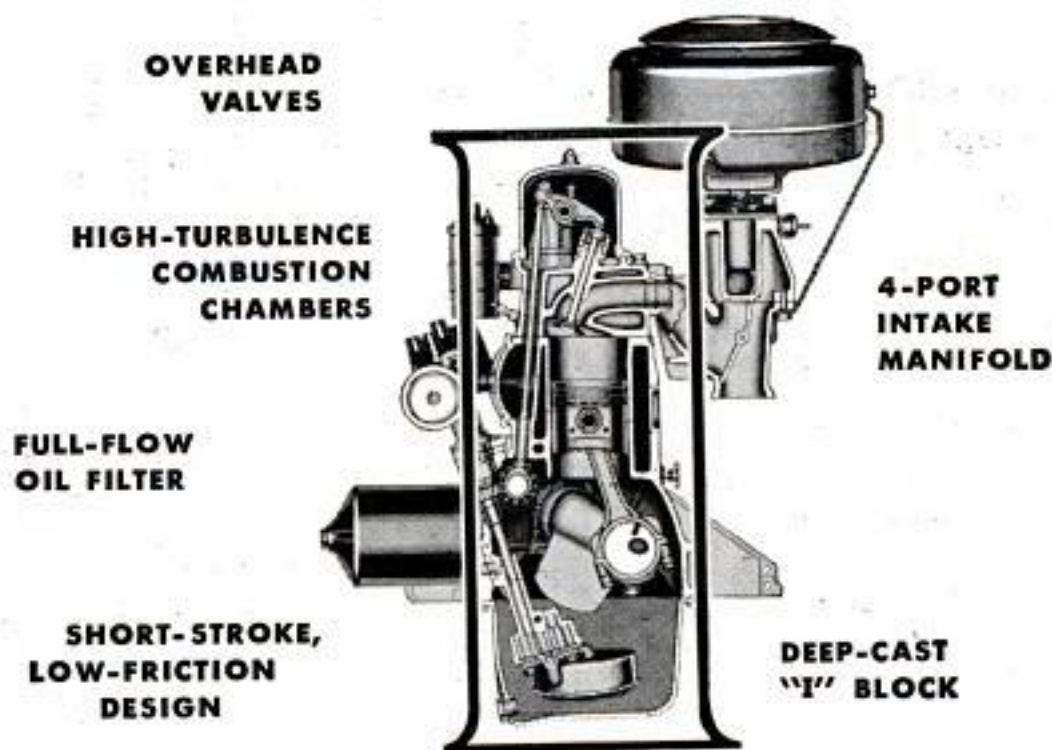
Both engines have extra-deep blocks that

extend well below the crankshafts, forming the "Y"- or "I"-shaped cross-sections. This results in far more rigid support for the crankshafts. Operation is far smoother and quieter, engine life far longer.

Free-turning overhead valves

Both engines have overhead valves that, in conjunction with their new intake manifold, permit free flow of *full* fuel charges to *all* cylinders for more responsive performance. Valves are free-turning to help maintain their tight seal, keep compression high for continued top efficiency.

Try the "Y" and "I" at your



THE NEW 115-h.p. I-block SIX

Short-stroke, low-friction design

Both engines are "oversquare," that is, the bore is greater than the stroke. The short-stroke design means less internal friction, more usable power from every drop of gas.

Full-flow oil filter

A full-pressure lubrication system with full-flow oil filter forces completely filtered oil to all vital bearing surfaces and engine parts. Engine wear is reduced up to 66%.

Base-mounting of oil filter eliminates external oil lines.

Choice of engines

Either the Y-block V-8 or I-block Six is available in any of Ford's 14 brilliant new body styles . . . and you may choose Fordomatic Drive or Overdrive, if you wish. Stop in at your Ford Dealer's soon and Test Drive a '54 Ford with either of these great new power plants.



Ford Dealer's today!

'54 FORD

(Continued from page 10)

from the edge of a high bank on our property in Auburn, Mass. I am quite certain that this shortened her life immeasurably.

At any rate, the maiden flight progressed well for a time. The craft handled surprisingly well and I was quite happy until I had completed about half the distance to the intended landing area in a group of bushes.

At this time, the tacks holding the forward edge of the upper-wing covering tore loose. The additional strain then did likewise to the lower wing and I was left without any visible means of support. As things began to let go, I decided to avoid being involved physically in an airplane crash, so I bailed out and landed in a snow bank. I am sorry to say that the remains of my glider were not so fortunate and the craft was a total loss.

As Mr. Hall stated, your magazine has provided an opportunity for quite a bit of fond remembering. My flight took place in the early '40s. May I say that I sincerely hope that PM's other "aviators" had better luck with their flights than I?

In closing, I would like to add that *Popular Mechanics* has held a position of considerable importance in our household for more years than I have lived. My father,

John A. Blaker, of Auburn, Mass., has been a reader, and occasionally a contributor of shop tips, since the teens.

Alfred A. Blaker,
Berkeley, Calif.

To the Editor:

Your article, "PM Glider, 1909 Model," recalled to my memory my attempt at this model glider.

I built one to one-half scale; I used this model as a kite and it was very successful and had good lifting power. My brother and I built a good-size parachute and would send our tomcat up for a ride. We used a special knot to fasten it onto the glider and when the glider would get up a couple hundred feet, by a few quick jerks on the cord, Mr. Tomcat would come drifting slowly down to earth.

Our parents finally put a stop to our experiment as the cat could not tell us if he liked this kind of sport, although I know he lived a good many years after his parachute rides.

H. E. Webb, Sr.,
Chicago.

Survival, He Says

Time was, and not so long ago either, when a fellow had to get out and get under

(Continued to page 260)

LOOK FOR THE CUPS!

REMOVABLE
R·O·W
WOOD WINDOWS

The advertisement features a photograph of a woman in a white dress removing a window sash. Orange arrows point to the sash guides. A circular logo contains the text 'REMOVABLE R·O·W WOOD WINDOWS'.

You can identify genuine R·O·W removable windows by the distinctive cups. These cups in the sash guides house the tension-adjustment screws.

This simple adjustment insures snug operation—full weather protection. Many competitors have tried to imitate R·O·W window construction. None have achieved R·O·W window quality.

In this illustration, sash have been removed entirely for easy washing of the storm windows.

See your local lumber dealer or write **R. O. W. SALES CO.** 1326-80 ACADEMY AVENUE • FERNDALE 20, MICHIGAN

R·O·W is the registered trade-mark of the R·O·W. Sales Co.

TRY **MONTA MOWER**
on YOUR OWN LAWN
on *Approval!*
9 1/2 LBS.



TRIMS AS IT MOWS!
SPECIAL TRIAL OFFER

Save time and labor! Actually "Two-Tools-In-One", the versatile MontaMower is an amazing work saver! Try it on your own lawn, on our Special On Approval Trial Offer! Its live, precision mechanism first gathers, then smoothly cuts a clean 16" swath through grass, dandelions, tall lawn weeds. Cuts right up to walls, fences, trees and under overhanging shrubs... practically eliminates hand trimming! Cuts steep banks easily! Cutting discs are now both Self-Cleaning and Self-Sharpening. Drive shaft mounted on permanently lubricated sealed bearings. Hundreds of thousands in world-wide use. Buy direct from factory and save. Owners Cooperation Plan can repay cost. Write today for full details on limited "On Approval... Trial Offer". Sold Direct Only.

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SILVER SOLDER TORCH & KIT \$7.95
JOINS ALL METALS PERMANENTLY



Do your own repairing. KIT includes one tube silver solder paste and 10 5-in. lengths silver solder alloy. Hot-test ALCOHOL TORCH known 2500° F. flame. Operates in any position, indoors or out. Plus of special fuel included. Complete outfit ready for use \$7.95 postpaid. TORCH alone with plus of special fuel \$6.85. KIT alone \$1.65. Instructions included.
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Super-sensitive! Only 1 1/4 lbs! Fits pocket—uses flashlight battery. Find a fortune in uranium. Order Now! Send \$5.00, balance C.O.D. MONEY BACK GUARANTEE. FREE CATALOG—scintillator and larger uranium and metal detectors. DEALERS WANTED.

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Provides dependable stand-by electricity for heating system, pumps, freezer, lights, appliances. Keeps home safe, livable. Automatic start and stop. Find out how little it costs!

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1,000 to 50,000 watts. Compact, quiet-running, easy to install. Gasoline engine powered.

Atkins Silver Steel Pruning Saws
for quick and easy pruning of small limbs and branches.




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Get a 12 point saw for fine finishing. Picks up where power tools stop.

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Use ATKINS, the Experts' Choice!

Whatever you need in saws, there's an Atkins *Silver Steel* for the job! Yes, Atkins complete line offers exactly the correct choice for the hobbyist, the home craftsman and the professional carpenter. Nearly 100 years experience goes into Atkins production of the right saw for every cutting job. Ask for Atkins at hardware stores and building supply dealers—you'll get the saw you want at the price you want to pay!

New Atkins Chamfer Chain!



U.S. PATENT NOS. 2,326,854 & 2,622,636

The greatest saw chain development ever! And—"It's The Chamfer That Does It"—an Atkins exclusive. Cuts smooth, fast and straight—stays sharp much longer. Get Atkins Chamfer Saw Chain for the easiest cutting you've ever known—available now for every make of chain saw.

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Other sandpapers also available for every sanding job.

HERE'S THE LATEST SANDPAPER DATA . . .

"SANDPAPER—How to Use and Choose" contains 32 pages of illustrated instructions. Send 10c for your copy to Behr-Manning Corp., Troy, N. Y., Dept. PM-3.

C-7



(Continued from page 258)

to the jeers of "Get a horse!" when his brassy Stoddard-Dayton began falling apart on rutted rural roads. He didn't know how easy he had it. Consider the problems of a fellow driving one of these high-flying jets of tomorrow when it bursts its seams 300,000 feet up. How's he going to get down?

There won't be much time to read the handbook if you wait until trouble happens when you're 50 or 60 miles high, but the



Dr. Fritz Haber

Air Force School of Aviation Medicine has a pamphlet ready for you. It's entitled "Escape and Survival at High Altitude," and the author is Dr. Fritz Haber, erstwhile German aircraft designer, lately a member of the School's department of Space Medicine, and practicing as an

engineer in Baltimore, Md., at present.

One of the things that need not worry you, surprisingly, is the anticipated shock of bailing out into the wind from a rocket ship traveling at ten times the speed of sound. At 300,000 feet, says Dr. Haber, the air doesn't have the dynamic pressure of lower altitudes; you could hop out with the fearlessness of a Rover Boy but your troubles would accumulate on the way down.

Even as low as 63,000 feet, for example, your blood will boil at normal body temperature, so for the first few miles of descent you'll need a sturdy pressure suit and an oxygen canteen. If claustrophobia doesn't annoy you, that could be arranged. But you'll want to hurry down the first 280,000 feet to rejoin the earth's air supply, and in a free fall you're likely to pick up a bit of unwonted speed, say two or three times the speed of sound. Cheer up, the earth's atmospheric cushion will slow you down to about 100 miles per hour—but you won't like the sensation. When you hit the 100,000-foot level, says Dr. Haber, it will feel something like smacking flat on a pool of water with a force of 4 to 300 G—4 to 300 times the force of gravity. Dive brakes, of course, may help.

If you have survived thus far, a parachute might bring you back to earth alive, but we're not promising.

So don't be hasty. These things take time, and the Air Force School of Medicine is working on problems 'way ahead of you.



Nature at its Best

**GENUINE HARDWOOD
PLYWOOD TABLE**

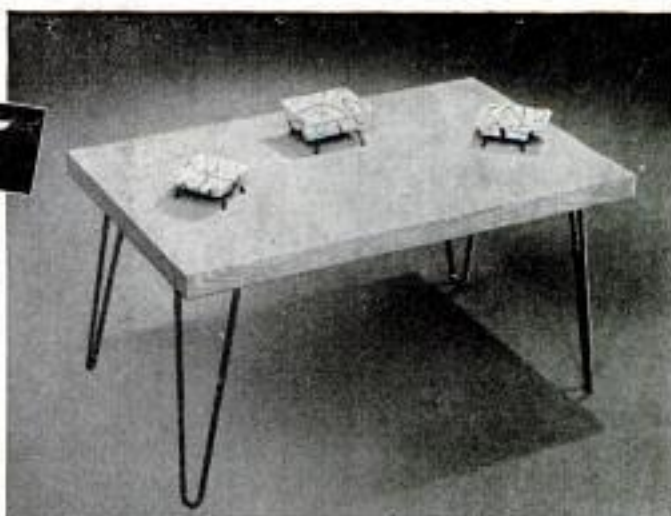
with **WROUGHT IRON LEGS!**
DO-IT-YOURSELF KITS

FUN TO ASSEMBLE! EASY TO FINISH!



- ATTACH LEGS WITH SCREWS FURNISHED.
- SAND TOP LIGHTLY, APPLY FINISH OF YOUR CHOICE.

Top is Genuine White Oak veneer and is available in solid hardwood or airplane-type construction core. Edge veneers are electronically glued. Legs are hair-pin type of $\frac{3}{8}$ " velvet black wrought iron. Dimensions: 34" x 20" x 17 $\frac{1}{2}$ ".



YOU'LL HAVE FUN BUILDING THIS TABLE . . . AND YOU'LL SAVE MONEY TOO! ORDER YOURS NOW!
Price: Hollow Core Kit \$9.45; Solid Core Kit \$9.95.

HOME CRAFT SUPPLY CO., JASPER, INDIANA

Please send express collect _____ Table Kits (Hollow _____ Solid _____). I enclose check money order for \$ _____

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STREET _____
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PROTECT YOUR DOORWAY



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Shipped prepaid with complete assembly and installation instructions.

All-weather protection for your doorways with this beautiful canopy. 48" wide, 31" projection. Ruggedly constructed of top quality, lifetime Redwood, treated with Woodliss preservative. Aluminum hanging strip flashing seals watertight above door. Aluminum drain strip. Order yours, today.

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71 Elinor Ave., Akron 5, Ohio

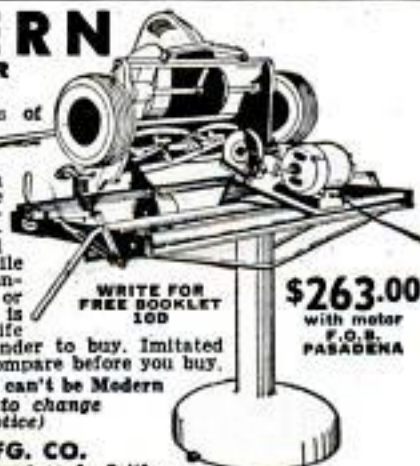
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"Architect Approved"

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DOOR CANOPY**

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LAWN MOWER
SHARPENER**

Service departments of leading Lawn Mower manufacturers use the Modern Lawn Mower Sharpener. One lever moves lawn mower into grinding position. Gasoline and oil remain in engine while sharpening; no dismantling of wheels, roller or handle. The Modern is a precision bed knife grinder—no extra grinder to buy. Imitated but never equaled—Compare before you buy. If it isn't a Modern it can't be Modern (Prices subject to change without notice)



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Mel Koontz Twists Tigers' Tails

(Continued from page 85)

"If I had nothing to do but break cats for circus acts I'd never think of retiring," he says with a grin. "Naturally I do best when I start with babies. Many a father has found out that if he didn't get close to his youngsters the first few years of their lives he never did. The early, formative period is the time to start doing things with them. It's the same with wild animals."

Koontz began his career in 1925, three years after he moved with his family to California from Kansas. In Los Angeles they lived near the old Selig Zoo, the first organization to supply wild-animal actors for films. The 15-year-old former farm boy hung around the zoo, doing odd jobs, until he was hired as an animal handler. Two years later he began his association with Jackie, the original Metro-Goldwyn-Mayer trademark lion that became the most famous four-legged star in Hollywood history. Before his death in 1952, Jackie appeared in over 500 films, beginning with a Tarzan movie in the late '20s and ending with comedian Harold Lloyd's "comeback" picture, *Mad Wednesday*. His son, Jackie II, in addition to his stellar performance in *Samson and Delilah*, has been seen in *Androcles and the Lion*, *The Lion and the*

Horse and many other movies. His grandson, Jackie III, began his film career two years ago in *Fearless Fagan*.

Mel Koontz trained each of the Jackie lions from birth. Old Jackie was the first jungle cat to work in close proximity to screen stars without chain, fence or other protection for the players. Other trainers claimed Koontz had a freak animal but he proved them wrong by accomplishing the same feat with a tiger and eventually with a black panther, considered the least likely member of the cat tribe to be successfully trained.

In the past 15 years, few film scenes involving animals have been faked because the documentary style of modern movies has made audiences critical. With 3-D and large-screen productions there has been even less faking, as depth makes it easier to detect an attempt at deception. The studios spend a great deal of time, effort and money on realism. When it comes to Mel Koontz and the educated animals of the World Jungle Compound, the realistic results justify all three.

"Sometimes a studio executive will question the expenditure of several thousand dollars on jungle scenes," Trader Horne reveals. "In such cases, we point out that our actors are dependable but that there's

(Continued to page 264)

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guaranteed for life—easy to install—
see it at your lumber dealer's now!**



DO IT YOURSELF Plankweld is genuine wood wall paneling, factory prefinished to soft deep lustre. Ready for immediate installation; each package contains special metal clips which are nailed to wall to hold panels in place. Panels are edge grooved and overlap to conceal clips and nailheads. If

you can hit a nail or saw a piece of wood you can install Plankweld easily. Can be installed on any nail-holding wall or directly to studs without furring. *Plankweld is guaranteed for the life of your home!* **CHOOSE THE WOOD YOU WANT.** 16 $\frac{3}{4}$ " x 8' Plankweld panels come prepackaged (108 $\frac{1}{2}$ sq. ft. to package) and are available in birch, Philippine or Honduras mahogany, plain sliced oak, and walnut, $\frac{1}{4}$ " thick. Now you can have a beautifully paneled wall for less than you think. See them all at your lumber dealer's or at any one of the 60 United States Plywood or U.S.-Mengel Plywoods showrooms located in principal cities, or write for complete information.

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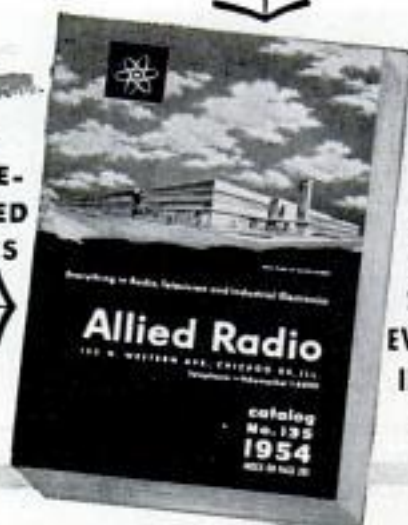
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no guarantee that one of them won't decide to make mincemeat out of Mel. All of the animals must have teeth and claws and, though they may seem tame at times, none could be called a 'pet.' Working in pictures, they're on their own to a great degree and there is always an element of danger."

It's hard to believe that Koontz has had but one serious accident, and that it occurred only last year. For MGM's remake of *Rose Marie* he had to get a mountain lion to leap from a tree onto a horse. The horse was stuffed but the lion was very much alive. It turned on Mel and both fell to the ground, where Mel grabbed a chair but was unable to fend off the animal. His shoulders and arms were chewed and his stomach ripped by its hind claws. When it tore a gash in his forehead his eyes filled with blood but he thwarted its efforts to get him by the neck by holding its jaws apart with his hands. In spite of his injuries he quieted it down and got it into its cage. The accident left him with 18 separate wounds requiring stitches and he didn't work again for seven weeks.

"It would never have happened," he says, "if I hadn't had an eye infection at the time. I was wearing dark glasses and was unable to read the cat's expression. Otherwise I would have anticipated and prevented the attack. There I was, continuing to sweet talk him when I should have been bawling him out."

With no thought of hokum (if anything, he's publicity-shy), Mel reveals what he believes is the reason for his singular success—a natural gift he discovered he possessed when he was about eight years old. On the farm he learned to "read" the minds of animals and more than once saved a pail of milk by knowing in advance that Bossie was going to kick. Nowadays, he frequently gives an apparently innocent animal a severe tongue-lashing or a sharp slap—"not for what he did, but what he was thinking of doing." When a big cat scratches him, in play or in earnest, his reaction is invariable.

"Look what you've done," he'll admonish. "Lick it off. If you don't, I'll twist your tail!"

On many such occasions, spectators who crowd the Compound on an average of 5000 a week are amazed to see the cat comply. Should it hesitate, Mel will make good his threat and nine times out of ten the offending animal will lick his hand, arm or face, thus proving that the so-called "blood craze" of caged wild animals is pure fiction.

Whatever his secret may be, he hasn't been able to pass it on. While he's trained a number of other trainers, none of them has developed his knack for working animals loose in the open. As yet, no one has

(Continued to page 266)

**RELIEVES
HEADACHE
NEURALGIA
NEURITIS PAIN**

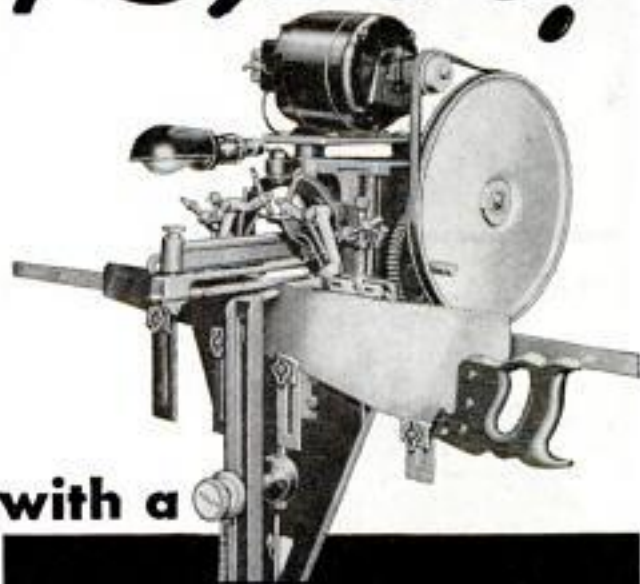
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\$3,000!**



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**FOLEY automatic
SAW FILER**

"Last year's profit amounted to \$3,000. Not so bad for a one-man outfit" — from Chas. C. Hough. James B. Williams wrote us—"I made \$765 last year filing saws, and it sure comes in handy. I do this work in my spare time." Men in communities of all sizes make up to \$3 or \$4 an hour with the Foley Saw Filer working full time or part time.

It's no trick to take care of the saw filing for your neighborhood hardware or lumber dealer — plus looking after the saws for farmers, townspeople, manual training departments and factories. The Foley files all hand saws, also band and cross-cut circular saws. It's a repeat cash business, no canvassing, no eyestrain and no experience needed.

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FREE PLASTIC DISPENSER

COIN SCOOP

UP CAP

79¢

Capr. United Feature Syndicate, Inc. 1954

come along who could step into his boots and meet all the requirements of the movie industry. That's why Billy Richards and Trader Horne turn deaf ears whenever he talks about quitting.

On a movie set, Mel's appearance is disarming. Wearing an old slouch hat and scuffed shoes, he looks like a grip or an electrician. When he goes into action he seems something of a psychologist and appears to dominate the animals with will power that is almost hypnotic. When *Tanganyika* was being filmed, I watched him stand 50 feet from Jackie, after getting him to lie down in tall grass. Then, when director Andre de Toth gave the signal, he talked the big cat into picking up a large piece of meat at his feet and slowly advancing toward the camera. What made this all the more impressive was the fact that it was Jackie's regular feeding time.

During his career he has run across only one bit of action called for in the script that did not reach the screen. He trained a team of lions to pull a wagon, galloping them around a Los Angeles parking lot. They were supposed to wind up hitched to a chariot driven by Claudette Colbert in *The Sign of the Cross*, and no one connected with the production was more disappointed than Mel when the technical adviser vetoed the stunt. He drew some consolation from the reason given for the refusal: The Romans simply did not have any animal men capable of turning the trick. ★ ★ ★



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See the Bronson Spinit at your sporting goods counter—only \$17.95. Other Bronson and Bronson-made J. A. Cox reeels are priced from \$2.95 to \$33.00.

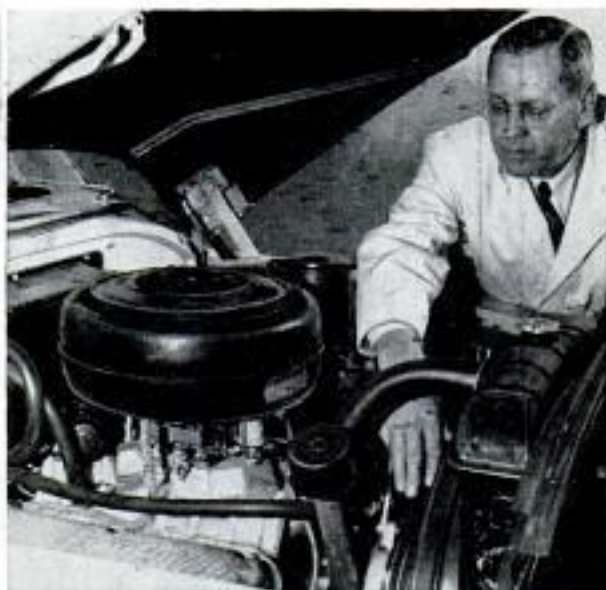
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Outworks, outlooks them all—blue-green anodized aluminum, bronze bearings, silent wind, free-stripping with governor-controlled retrieve.





Chrysler's big V8 engine was boosted to 235 horsepower without increasing compression or displacement

The Owners Report on the Chrysler

(Continued from page 96)

carelessness in assembling car."—Chicago mechanic.

"After only 2460 miles my particular car is developing rust spots where it isn't finished off well near chrome and stainless steel. Also the gas filler is in very poor

location."—Miami Beach, Fla., contractor.

A few complained about the location of the rear-view mirror.

"Mirror not placed right. Partially obscures forward vision."—Piper City, Ill., farmer.

Other owners were not pleased with the change-over from needle dials to flashing-light indicators for oil pressure and ammeter gauges.

When asked specifically about this change, 51 percent of the owners said it was good; 20 percent said it was poor; and 29 percent gave an indifferent answer. Here are some comments:

"Good. Easier to see when something goes wrong."—Rockford, Ill., tool and die maker.

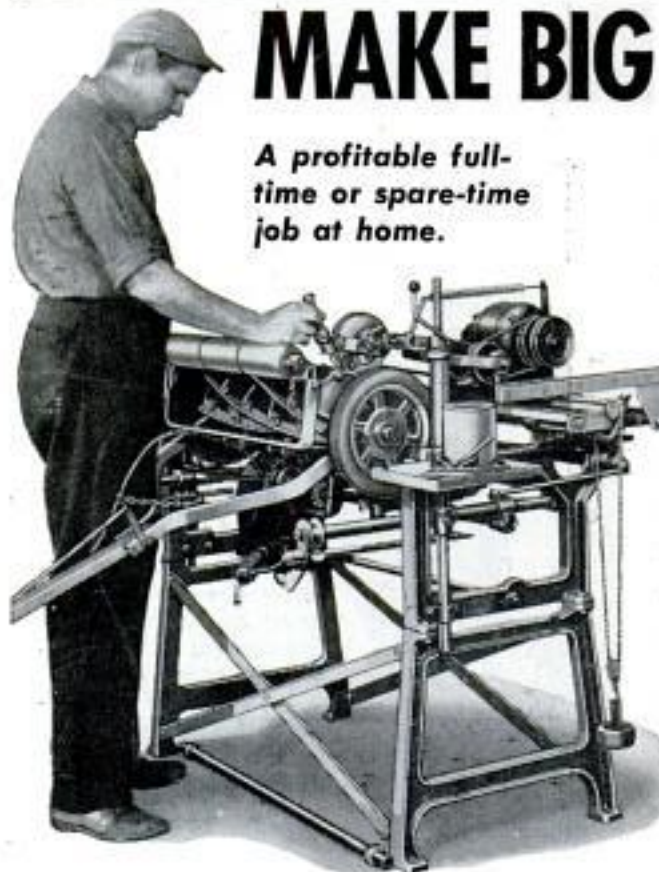
"Poor. I would like to know what the generator and oil pump are producing."—Bayside, N. Y., motor-vehicle supervisor.

"It does not give a true picture as you do not know how much the battery discharges. Also you can't see the red warning signals during the day."—Newark, N. J., retired owner.

"Unable to tell if you have too much oil pressure or if battery is overcharging."—Hobbs, N. M., salesman.

When asked to evaluate certain particular features, most owners showed greatest

(Continued to page 270)



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A profitable full-time or spare-time job at home.

NO EXPERIENCE NEEDED Simple to set up — easy to operate. Many have sharpened their first mower expertly just minutes after unpacking their Ideal!

NOTHING TO TAKE APART No need to disassemble the mower if you use an Ideal. Put the whole mower in the machine to get a razor sharp edge on bed knife and reel of any mower—hand or power.

USERS PRAISE IT "I have only praise for your machine. My customers think I am a wizard at grinding mowers!"—D. Pemberton.
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approval of forward visibility. Least-liked of specific features mentioned was exterior body styling—additional evidence of a feeling stated previously. Only 71 percent said they liked the present body styling. Riding comfort was liked by 92 percent of the owners; rear visibility by 91 percent and interior styling by 87 percent. For additional details on these and other points see the percentage chart that accompanies this article.

Why Did They Buy Chrysler?

In the questionnaire, owners were asked to state why they purchased a Chrysler. The answers were varied.

"I believe it is the best all-around car sold except for exterior styling."—Detroit, Mich., office manager.

"Primarily because of engine principles and design."—Oak Lawn, Ill., engineer.

"My wife liked the color."—a Chicago physician confesses frankly.

"Before deciding, I tried several others. Chrysler was decidedly superior."—Tolledo, Ohio, educator.

Previous satisfactory Chrysler ownership was the most common reason for buying the 1954 models.

Apparently the new Chrysler has converted some new owners because 83 percent say they will buy another Chrysler although only 67 percent have owned one previously.

Over-all, the Chrysler was rated excellent by 71 percent of all owners, good by 26 percent and average or poor by less than two percent each.

As would be expected, most owners of the V8 models rated acceleration as excellent. Windsor owners were less enthusiastic about acceleration.

Suggestions from Owners

Here are some suggestions selected from those submitted by the owners in the poll:

"Armrest on door should have handhold to use in pulling door shut."—Baileyville, Ill., farmer.

"Brake pedal could be wider and closer to the floor board so you don't have to lift your leg from accelerator to brake."—Genoa, Ill., farmer.

"Clock is hard to read and gasoline gauge is not accurate enough."—Tuckahoe, N. Y., manufacturer.

"Don't like tinted glass for night driving."—Gloversville, N. Y., grocer.

"Power steering has hissing noise when turning wheel to extreme right or left."—Smith Center, Kans., chiropractor.

"No ash tray handy for driver."—Perth Amboy, N. J., foreman.

(Continued to page 272)



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with my
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HOE**

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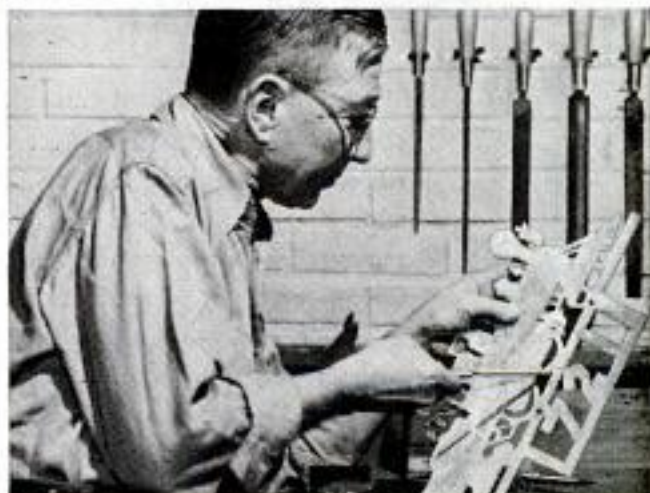


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My lumber dealer is.....

"Power steering is good, although perhaps a little more pressure on the wheel for slight turning would be better."—Burbank, Calif., service-station employee.

"Power steering is best I have tried."—Atlanta, Ga., traveling salesman.

"Power steering is more fatiguing on long trips than conventional steering. Constant juggling is needed to keep car on even keel and in proper lane on highway."—Jersey City, N. J., sales executive.

"Power steering is sensational for parking and getting out of tight places, but at 50 m.p.h., car has tendency to travel right to left slightly."—Bronx, N. Y., salesman.

"Chrysler's air conditioner is by far the best in the field. In Texas, I owned two other cars and their units are not in the same class as Chrysler's."—Colorado rancher.

And now for my own test—The car tested was a 1954 New Yorker DeLuxe four-door sedan with PowerFlite transmission. I drove the car 832 miles from Los Angeles to San Diego, and return, to Santa Barbara and return, and then over the mountainous Lake Arrowhead route which included some off-highway testing in the Mojave Desert. Thus a variety of driving conditions resulted.

Chrysler's engineers deserve credit for boosting last year's 180 horsepower engine to 235 horsepower without increasing piston displacement or compression.

There is little engine vibration at any speed and the 1954 New Yorker DeLuxe is certainly a "powerhouse on wheels" with dynamic performance. The power and acceleration, especially over 30 miles per hour is something to talk about.

The car was equipped with Hydra-Guide, Chrysler's power steering. Dual belts are used to operate the power-steering pump. It operates full time and takes a little "know how." Until one becomes familiar with its operation, he is inclined to oversteer as there is no "feel" of the road. I'd prefer a little pressure against the steering wheel in my power steering.

The car handled wonderfully well for a large automobile around the winding roads in the mountains. In the desert, the ease of cruising and top speed were remarkable. On a back-road test the speedometer hit 121 miles per hour (approximately 113 miles per hour actual speed), which places Chrysler well at the top of 1954 performers.

As in many cars, there is a sensation of front-end "floating" at high speed and some roll on corners, but Americans seem to prefer this soft ride to the harder springing and better cornering characteristics of foreign sports cars.

(Continued to page 274)

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1954 CHRYSLER SPECIFICATIONS

ENGINE

	Windsor DeLuxe	New Yorker	New Yorker DeLuxe
Type	6-cyl., in-line, L-head	8-cyl., V-type, OHV	8-cyl., V-type, OHV
Bore and stroke.....	3-7/16 x 4¾ in.	3-13/16 x 3½ in.	3-13/16 x 3½ in.
Piston displacement.....	264.5 cu. in.	31.1 cu. in.	331.1 cu. in.
Compression ratio.....	7.0:1	7.5:1	7.5:1
Brake horsepower.....	119 at 3600 r.p.m.	195 at 4400 r.p.m.	235 at 4400 r.p.m.
Transmission	3-speed unit standard PowerFlite automatic drive optional extra	PowerFlite automatic drive standard	PowerFlite automatic drive standard

CAPACITIES

Oil	5 qt.	5 qt.	5 qt.
Water (with heater).....	16 qt.	26 qt.	26 qt.
Gasoline	17 gal.	20 gal.	20 gal.

GENERAL

Steering ratio (over-all).....	25.8:1	25.8:1	25.8:1
Steering wheel (lock to lock).....	5	5½	5½
Turning diameter (curb to curb).....	41 ft. 9 in.	41 ft. 9 in.	41 ft. 9 in.
Brakes	Conventional hydraulic with bonded linings.		Conventional hydraulic with bonded lining.
Tire size.....	7.60 x 15	8.00 x 15	8.00 x 15
Recommended pressures.....	24 lb. front and rear	24 lb. front and rear	24 lbs. front and rear
Shipping weight (4-dr.).....	3685	3955	4060 lb.
Wheelbase	125½ in.	125½ in.	125½ in.
Tread, front.....	56-5/16 in.	56-5/16 in.	56-5/16 in.
Tread, rear.....	59¾ in.	59¾ in.	59¾ in.
Height, over-all (4-door unladen).....	64¼ in.	64½ in.	64½ in.
Width, over-all (4-dr.).....	77½ in.	77½ in.	77½ in.
Length, over-all (4-dr.).....	215½ in.	215½ in.	215½ in.
Road clearance.....	7¾ in.	7¾ in.	7¾ in.

INTERIOR DIMENSIONS

Front-seat width.....	61½ in.	61½ in.	61½ in.
Rear-seat width.....	60⅞ in.	60⅞ in.	60⅞ in.
Headroom, front.....	36½ in.	36½ in.	36½ in.
Headroom, rear.....	36 in.	36 in.	36 in.
Legroom, front.....	43½ in.	43½ in.	43½ in.
Legroom, rear.....	41¾ in.	41¾ in.	41¾ in.

The Oriflow shock absorbers do a good job of controlling the ride and, even on the hardest bumps at high or low speed, it was impossible to make the front end hit bottom. Chair-high seats, which Chrysler products have used for years, and air-foam rubber cushions help give an extremely comfortable ride.

Chrysler has long had excellent brakes. I noted little tendency to fade in mountain or high-speed driving. The test car had power brakes and, while the operation is extremely smooth, the short movement of the brake pedal makes the operation very sensitive.

Chrysler's parking brake is external-expanding and easily applied by the left-hand lever—but I can't get enthusiastic about its location (at the rear end of transmission). I prefer a parking brake with two units operating on rear wheels.

The interior of the car is luxurious with functional crash pads that extend across the top and bottom of the instrument panel. The top of the panel has a dull finish, which does not reflect the sun—an excellent arrangement both for safety and comfort.

The driving position is comfortable and the instruments are located directly in front of the driver and can be seen easily as there is no upper-half horn-ring obstruc-

tion. Chrysler now uses red warning-light signals to indicate low oil pressure and battery discharge. I'd prefer gauges with indicators to show what is happening to oil pressure and generator output.

Chrysler's fresh-air system is particularly good, letting cool air in through an opening at the top of the cowl just in front of the windshield. This, in my opinion, is much better than an arrangement in which air is drawn through ducts up from the grille, as on many other makes. The ventilator is operated by the foot. The vent pedal, however, is attached to the lever with two screws. On the test car, these screws worked loose twice and the pedal flopped around. It would be better if this foot pedal were permanently attached to the lever.

The body is solid and I found no water leaks. It is remarkably free of rattles and squeaks.

I found some hood flutter over rough roads and at extreme high speeds, which could be reduced by using a shorter, more sloping, stubby hood. With the V8 engine, Chrysler could have a shorter hood to improve ground vision in front of the wheels.

As in all makes of automatic transmissions, the Chrysler owner must expect slightly less mileage than if his car were

(Continued to page 278)

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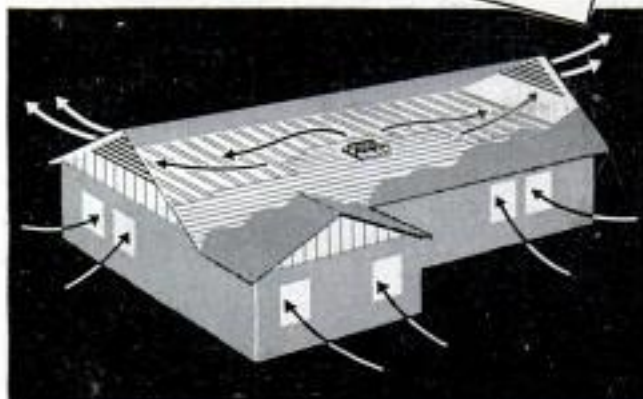
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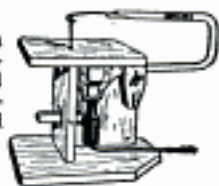


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equipped with conventional transmission or overdrive. I found gas economy satisfactory for a car of its size and horsepower. (See economy chart). Even with the increased horsepower that Chrysler offers for 1954, gasoline mileage was equal, and in some instances better, than my previous test of the 1951-model Chrysler V8—and I attribute this to the new PowerFlite transmission which I rate very high as a well-designed quality unit.

Like all other makes of automatic transmissions (excepting one), the Chrysler unit creeps when the car is "motionless" with lever in Drive or Low with the engine running. It is still necessary to touch the brake pedal to hold the car in a stationary position on level ground.

The PowerFlite affords a full automatic power shift that is extremely smooth when accelerating from zero to top speed. An automatic upshift in Drive takes place between 15 and 65 miles per hour depending upon the throttle opening. The kick-down (passing gear) operates perfectly at speeds below 55 miles per hour when the throttle is fully depressed. The automatic downshift occurs at approximately 11 miles per hour and is noticeably rough.

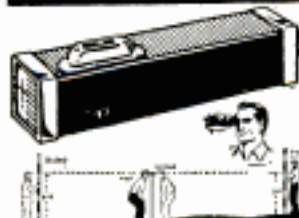
In tests of the kick-down (passing gear) operation from 30 to 65 miles per hour (when the unit automatically shifts to top gear) I found PowerFlite to be six seconds faster in reaching 65 miles per hour than last year's model with the old semiautomatic transmission. This is certainly a big improvement and an added safety factor.

Of all the self-shifters used on higher-priced cars, PowerFlite is the lightest, weighing 214 lb. Other makes vary from 246 lb. to as high as 314 lb. Chrysler claims that PowerFlite has fewer parts than any other automatic transmission available. There are 185 major parts in PowerFlite, which is considerably less than in other makes. (One make has 295.) ★ ★ ★

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High-frequency radio receivers no bigger than a pack of cigarettes and powered by two flashlight batteries may become standard military equipment. A tough, stable germanium transistor developed by Philco would make them possible. Another use would be in a rescue transmitter built into lifeboats and rafts. As soon as the transmitter unit came into contact with sea water, it would start broadcasting on the international distress frequency. The new transistor, able to handle higher frequencies than other transistors, can be mass-produced with great speed and accuracy.

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44 Pc. SOCKET SET
(Item 59a) Same unconditionally guaranteed non-breakable sockets as above—but with added sizes. Complete range of 23 sockets from 1/4" thru 7/16" (1/2" drive) & 7/16" thru 1 1/16" (1 1/2" drive). Two extensions, reversible 1/2" ratchet, 3 drill punches, sliding 1/2" head, angle coupling, 1/2" speeder, 1 1/2" breaker, 5 pc. high chrome alloy combination wrench set and 8 pc. offset wrench set in big doghouse tool box with ample room for other tools. Reg. \$49.50..... **\$21.95**

52 Pc. SOCKET SET
(Item 203) Contains a complete set of 28 sockets in 1/2" drive, 3/4" drive and 1 1/4" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all unbreakable, guaranteed against breakage. Beautifully matched chrome thin wall alloy sockets in a big, doghouse steel box. Wt. 17 lb. List price \$62.90..... **\$27.95**

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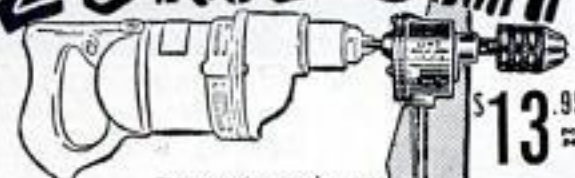
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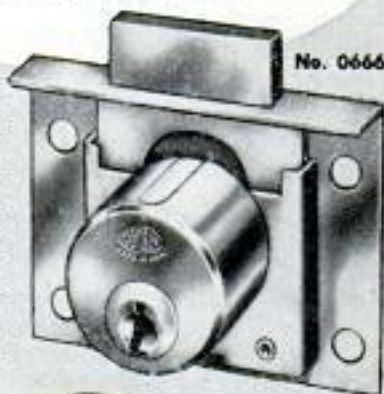


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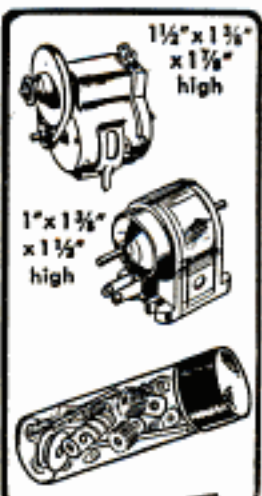
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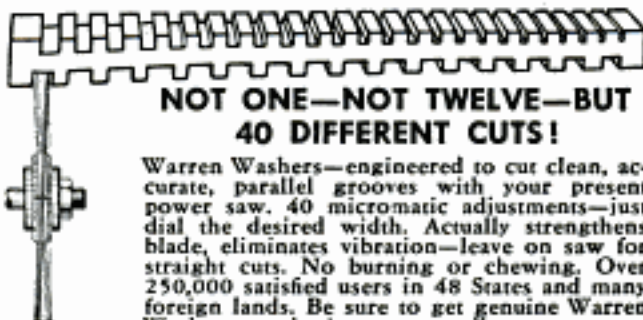
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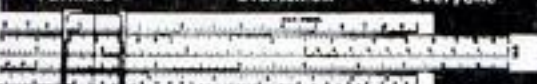
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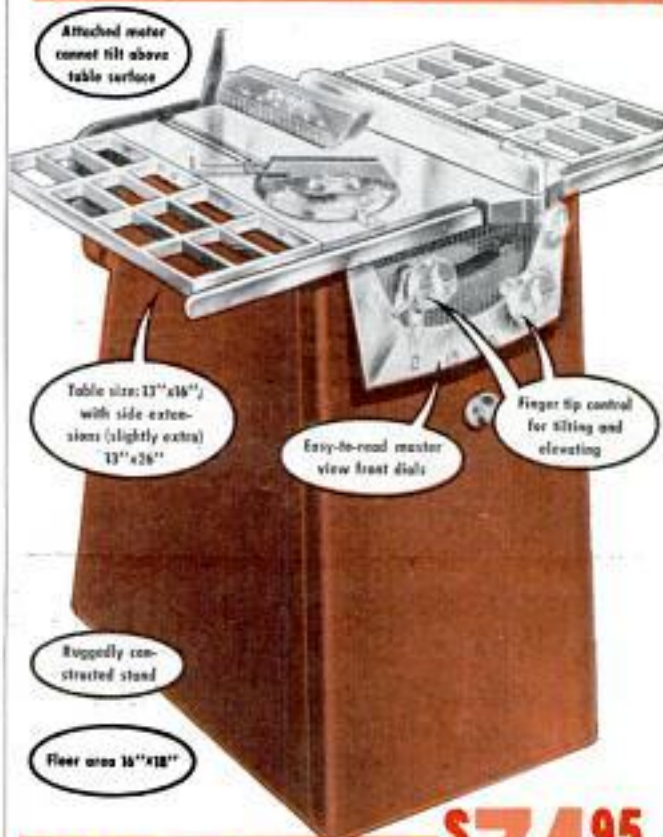
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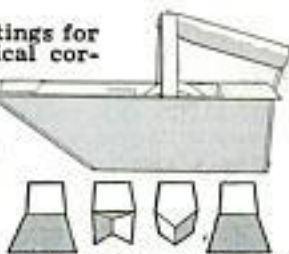


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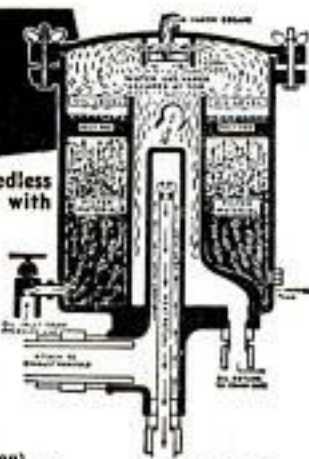
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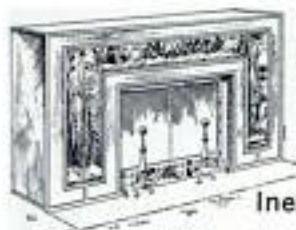
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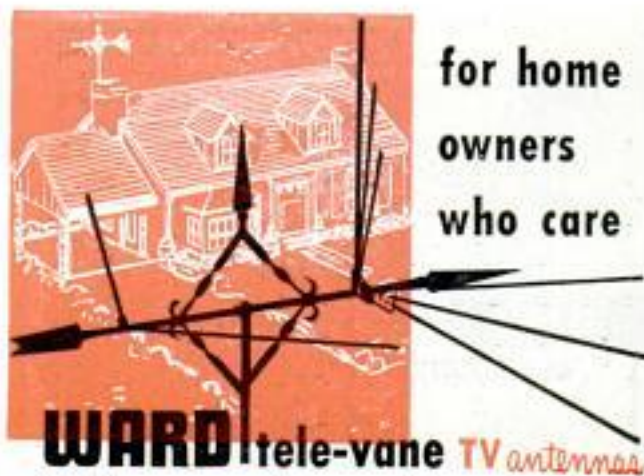
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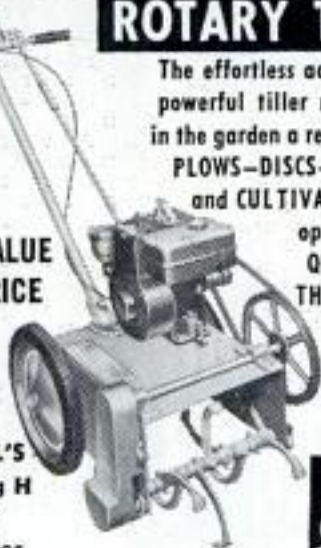
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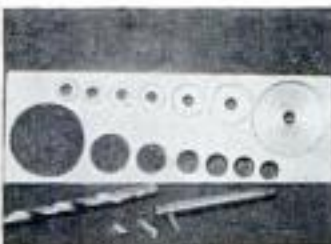
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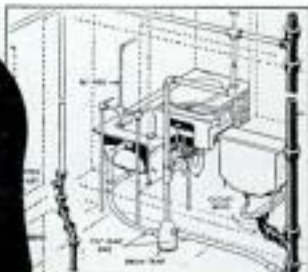
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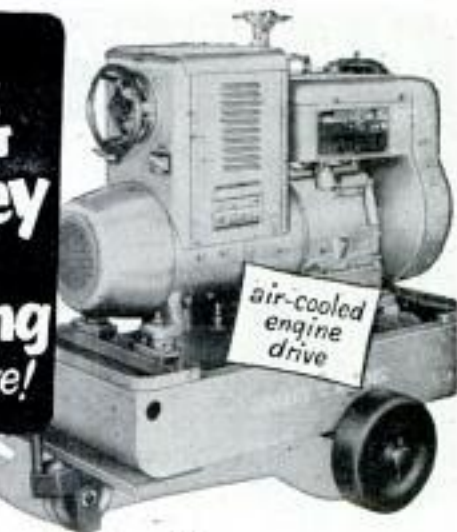
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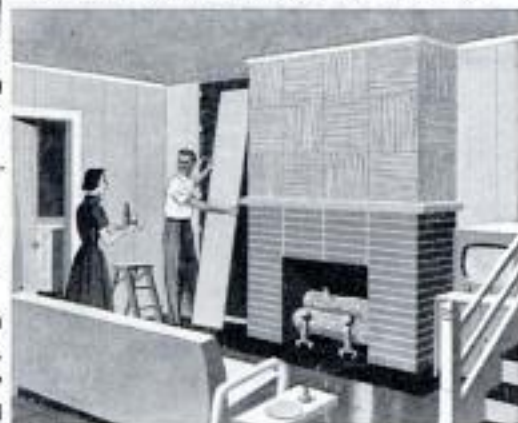
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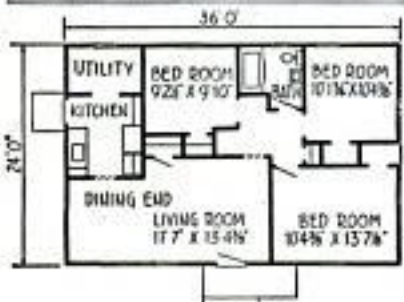
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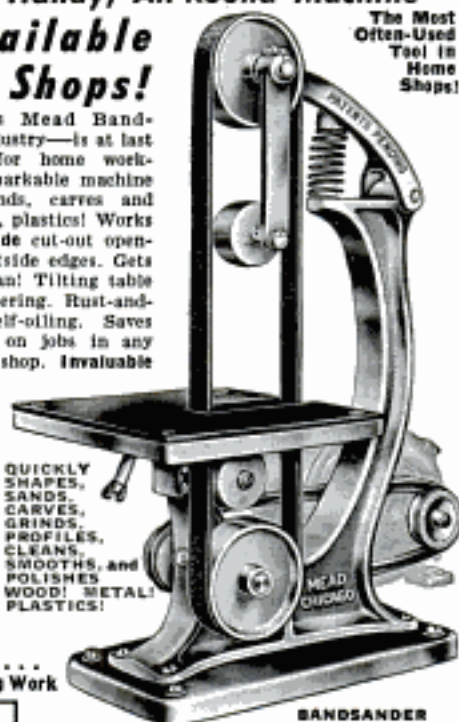
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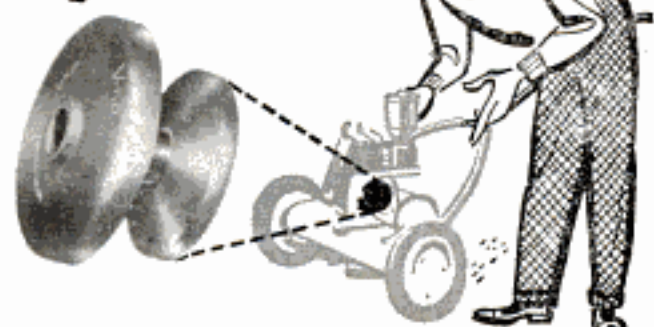
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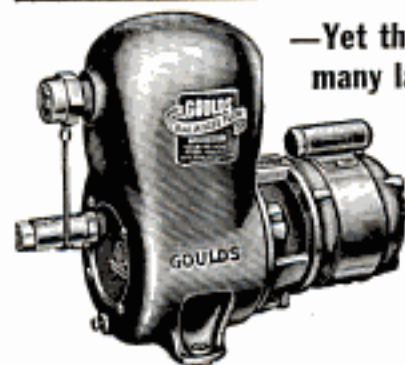
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- New Departure ball bearing arbor, 3/4" precision shaft turned down for 5/8" bore blades, alum. housing, shipped ready to run
- Jackscrew and 4 1/2 in. dia. hand-wheel lowers and raises blade
- Cast aluminum miter gauge and self-aligning rip fence guide

GIL-BILT Metal Parts Kit includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dado insert, lock knobs, jackscrew mechanism and handwheel, and all other metal parts (less blade).....\$22.95

Same Kit with 10" Combination Blade.....\$25.90

Same Kit with 8" Combination Blade.....\$24.90

12-INCH BAND SAW

- Cuts to center of 24 inch circle
- Handles stock up to 6 inches thick
- 18x18 inch table tilts 45 degrees
- Lower wheel and drive pulley runs on sealed New Departure Ball Bearings: Upper wheel runs on two 5/8" bore Oilite Bronze bearings
- Upper wheel tension and tilt mechanism of cast aluminum, completely assembled
- Upper and lower blade guides. Each has ball thrust bearing, self-lub bronze jaws
- Rigid cast aluminum wheels fully machined ready-to-install. Heavy rubber tires
- Uses standard 78 inch blades up to 3/4 inch wide
- Fully enclosed mechanism for utmost safety

GIL-BILT Metal Parts Kit includes Plans, rubber tires, aluminum wheels, 1/4 in. blade, ball bearing spindle, tilt mechanism, blade guides, table tilt segments, and all other metal parts.....\$23.95



ALSO AVAILABLE
Plans & Parts
Kits for 18-in.
Band Saw, Belt
Sander, 8-in.
Tilt-Table Saw

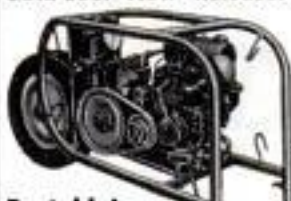
Return Kits in 10 days for refund if not satisfied.
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Made by BENDIX WESTINGHOUSE to rigid specifications. A BUY for Contractor, Farm, Garage, Service Station, Factory, Shop! Two independent air outlets—one for high pressure (up to 200 lbs.)—the other controlled by regulator from 0 to max. 5.3 C.F.M., supplies sufficient air to maintain 40 to 65 lbs. pressure for CONTINUOUS spraying (no waiting until tank keeps building up). Large face gauge. Adjustable Safety release valve. Automatic unloader (adjustable up to 300 lbs.) keeps pressure constant without stopping engine. Hollow frame acts as reservoir assuring large supply of OIL-FREE air with ABSOLUTELY NO PULSATION! Unexcelled for: Spraying; Greasing; Tire inflation; Blowing out heating and refrigeration lines; Small pneumatic tool operation; Insecticide dusting and spraying; Flocking; Undercoating!

SPECIFICATIONS:

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|---|---|
| <ul style="list-style-type: none"> • Mfg. by BENDIX WESTINGHOUSE • Twin cylinder • 4 Rings on each piston for added compression—capable of pumping 1100 lbs. p.s.i. • Forced pressure lubrication assures oil to every moving part • Ball bearing construction • Capacity 5.3 cu. ft. | <ul style="list-style-type: none"> • Mfg. by BILGGS & STRATTON • Kick or rope start • 2 HP, 4 cycle air cooled • Splash lubrication system • 2 qt. gas tank • Float feed carburetor with adjustable idle speed and automatic governor • 3 piston rings |
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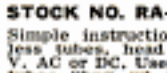
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RECORD CHANGER**

**with Shure Turnover Cartridge
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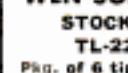


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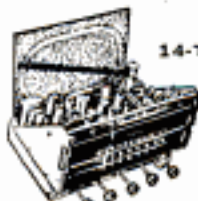
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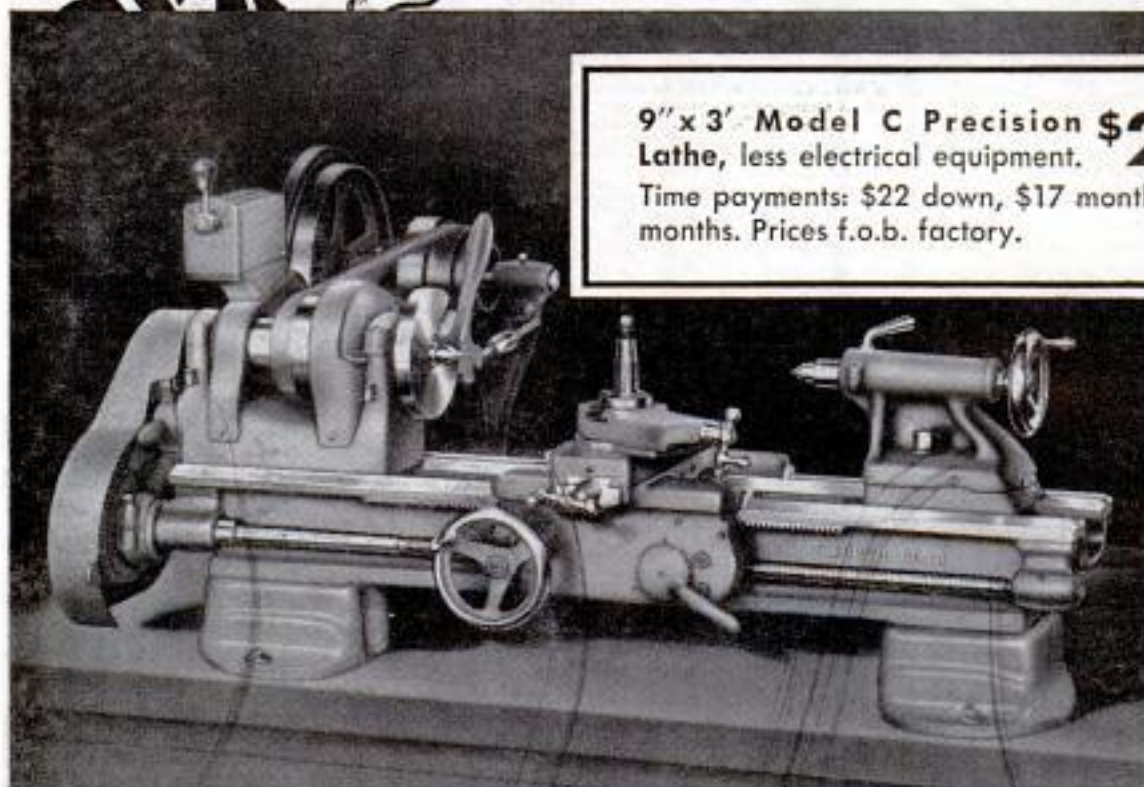
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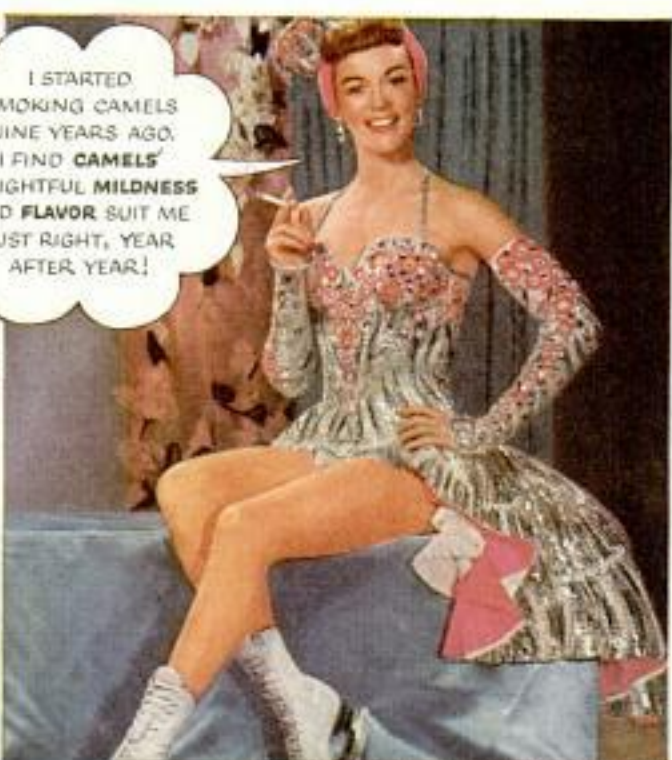


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